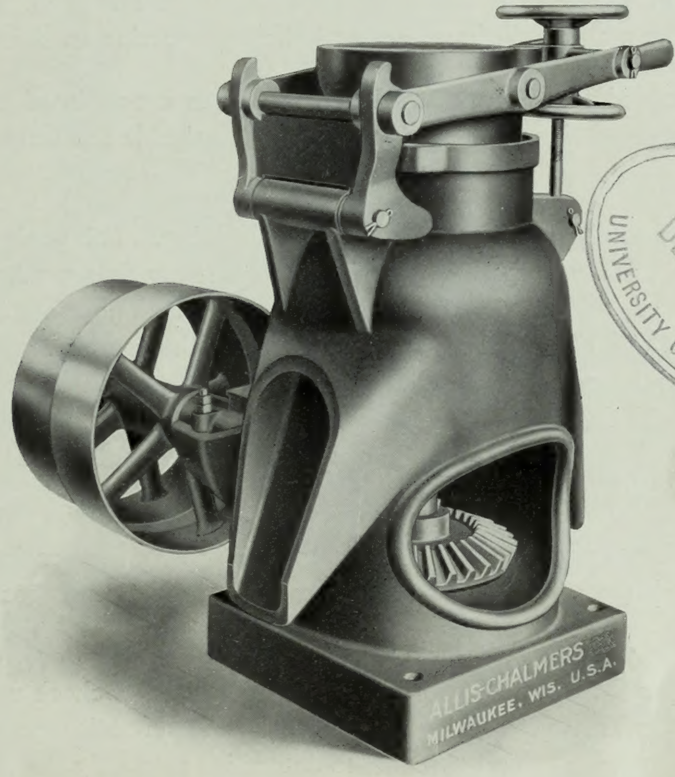
75
45
.1802A
IN STORAGE
Engineering
523

Allis-Chalmers
Manufacturing Company

Bulletin No. 1802A **September, 1915**

Sampling Machinery and Equipment

Plate No. 2911



Sample Grinder, Style "B"

LIBRARY
DEC 12 1972
UNIVERSITY OF TORONTO

Copyright 1912

MILWAUKEE, WISCONSIN, U. S. A

Catalog No. 1322
Year of Issue 1915
Please return to
Section No. A. 6-3
Catalog Library
Department of Mining Engineering

"Sampling" and Sampling Machinery

INTRODUCTION

To separate an average portion from an entire lot or mass of material, is technically known as "sampling." At metallurgical works sampling is performed for the purpose of securing a convenient amount of material to handle which will represent the average value of the mass from which it is taken and which, when analyzed, will show what the constituents of the material in hand are and their proportion to the whole.

Ores are sampled to determine their value and to ascertain of what materials their mineral and gangue portions are composed, so that suitable treatments for them may be decided upon.

Sampling essentially consists of crushing and dividing. It is performed either by hand or by machinery. When done by hand the materials are first crushed to a suitable size for handling, mixed, and worked into a uniform mass. The mass is then divided into several parts and one of these parts separated from the remainder. This part is again mixed, divided, and a part separated as before; this same operation being continued until a final sample of the desired size is secured. Usually, however, the material is re-crushed one or more times between the dividing operations, the extent of this crushing depending upon the size desired for the final sample.

When sampling is performed by machinery, the process is essentially the same, except that the material is usually reduced between each of the dividing processes.

All up-to-date smelters, whether they treat only their own ores or do custom work, have sampling plants, as by this means only can they keep a check upon the results they are securing. Other metallurgical plants, such as concentration plants, cyanide plants, and lixiviation plants, use sampling plants to determine primarily the value of the ores they are treating and to keep a check upon the work of the plant.

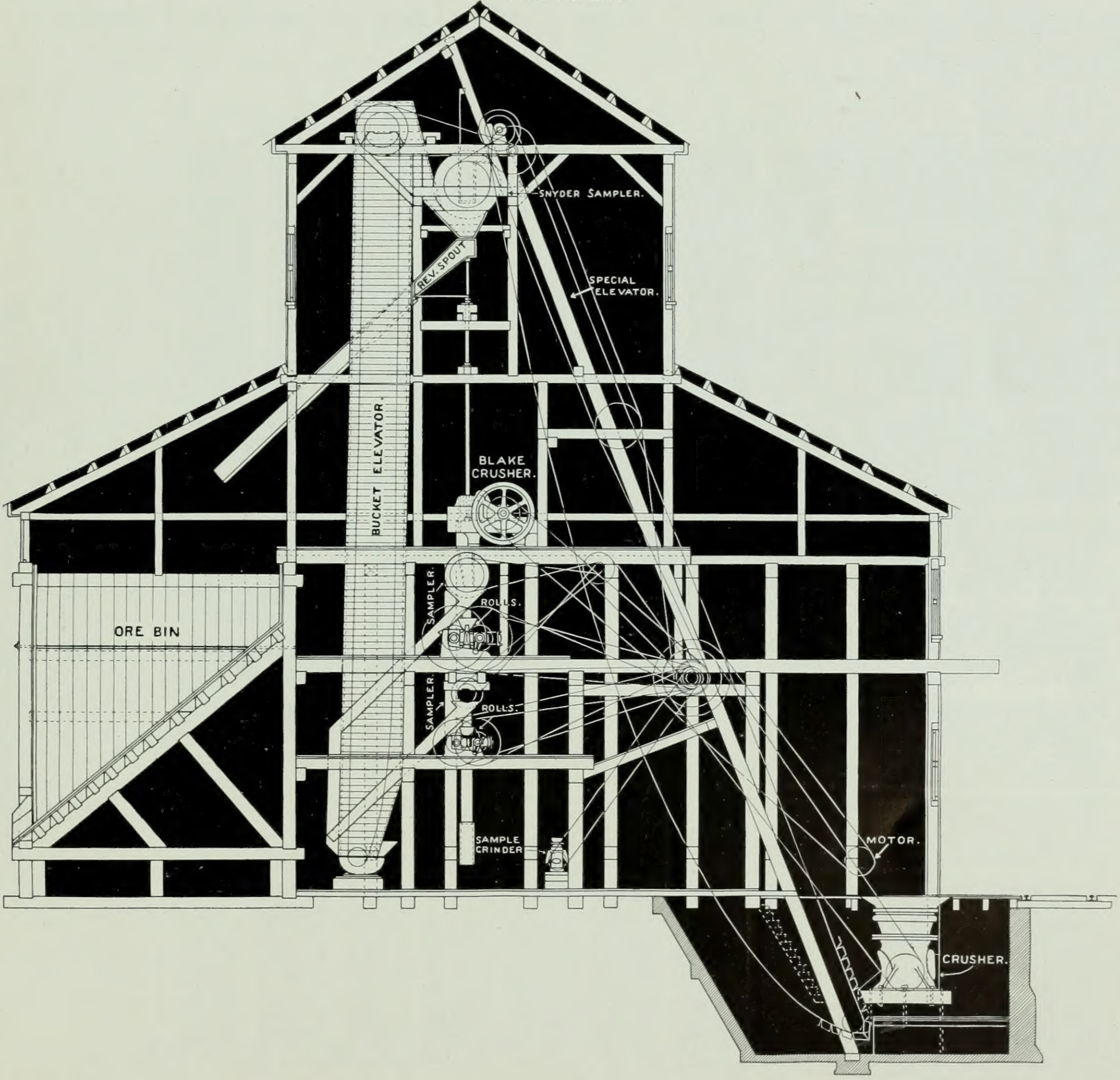
Allis-Chalmers Manufacturing Company designs and furnishes the equipment for sampling plants of any desired capacity. On the following pages are described and illustrated typical sampling plants of various capacities, and machinery built for the equipment of such plants.

AUTOMATIC SAMPLING MILL

A sectional elevation and plan of a large Automatic Sampling Mill ordinarily rated at a capacity of 35 tons per hour is shown below and on page 4, respectively. The course of the ore through this mill is as follows:

On being received it is fed into a No. 5 Gates Rock and Ore Breaker, which reduces it to about a 3-inch size. It falls to a No. 6 Gates Elevator, which raises it to the 60-inch Snyder Automatic Sampler at the top of the mill. This sampler takes a 15 per cent cut, the rejections dropping into a distributing hopper directly below the sampler. The sample itself falls to a 9″ x 15″ Blake Crusher. This crusher reduces it to about a 1½-inch size, and from there it falls to a 42-inch Snyder Automatic Sampler. This sampler takes a

Plate No. 2650



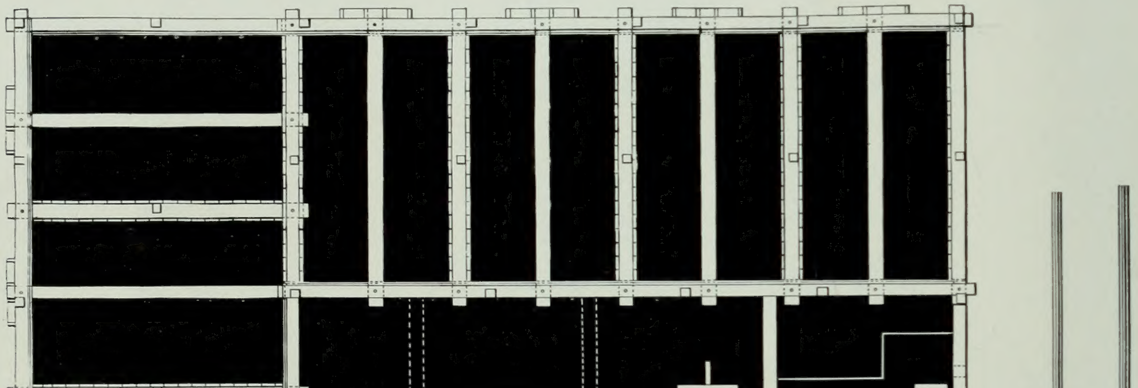
Large Automatic Sampling Plant
(Elevation)

20 per cent cut, the rejections falling to a 10-inch bucket elevator and the sample to a pair of 24″ x 14″ rolls. These rolls reduce the sample to about three-quarters of an inch in size. From these it falls to a 27-inch Snyder Automatic Sampler. This sampler also makes a 20 per cent cut, the rejections falling as before to the 10-inch bucket elevator, and the sample falling to a pair of 18″ x 10″ rolls. These rolls reduce the sample to about a ¼-inch size. From the rolls the sample falls to a quartering floor, where it is quartered down to the desired size and finally reduced in a Style "A" Sample Grinder.

The 10-inch bucket elevator raises the rejections from the 42-inch and 27-inch samplers to the top of the mill and discharges them into the distributing spout under a 60-inch sampler. This distributing spout is arranged to revolve and direct the ore into any of the various bins of the mill as desired.

This mill gives a 6-pound sample on the quartering floor for each 1,000 pounds passed through the mill.

Plate No. 2678



Large Automatic Sampling Plant
(Plan)

AUTOMATIC SAMPLING MILLS

An elevation and plan of an Automatic Sampling Mill, ordinarily rated at a capacity of 7 to 8 tons per hour, is shown on pages 6 and 7, respectively. The course of the ore through this plant is as follows:

The ore is fed first into an 11″ x 15″ Dodge Crusher, which reduces it to about a 2-inch size. From there it falls to a 10-inch bucket elevator, which raises it to a 42-inch Snyder Automatic Sampler at the top of the mill. This sampler makes a 20 per cent cut, the rejections passing to a bin in the front of the plant and the sample itself to a pair of 24″ x 14″ rolls. These rolls reduce it to about 1 inch in size. From these it passes to a 27-inch Snyder Automatic Sampler. This makes a 20 per cent cut, the rejections passing to a bin in the front of the plant as before and the sample to a pair of 16″ x 10″ rolls. These rolls reduce it to about one-quarter inch in size and it falls from them to a 9-foot square steel quartering floor on the lower level of the mill. Here the sample is quartered down to the desired size and the final sample reduced in a Style "B" Sample Grinder.

This mill gives a sample of 40 pounds on the quartering floor for each 1,000 pounds passed through. Its operation is essentially automatic.

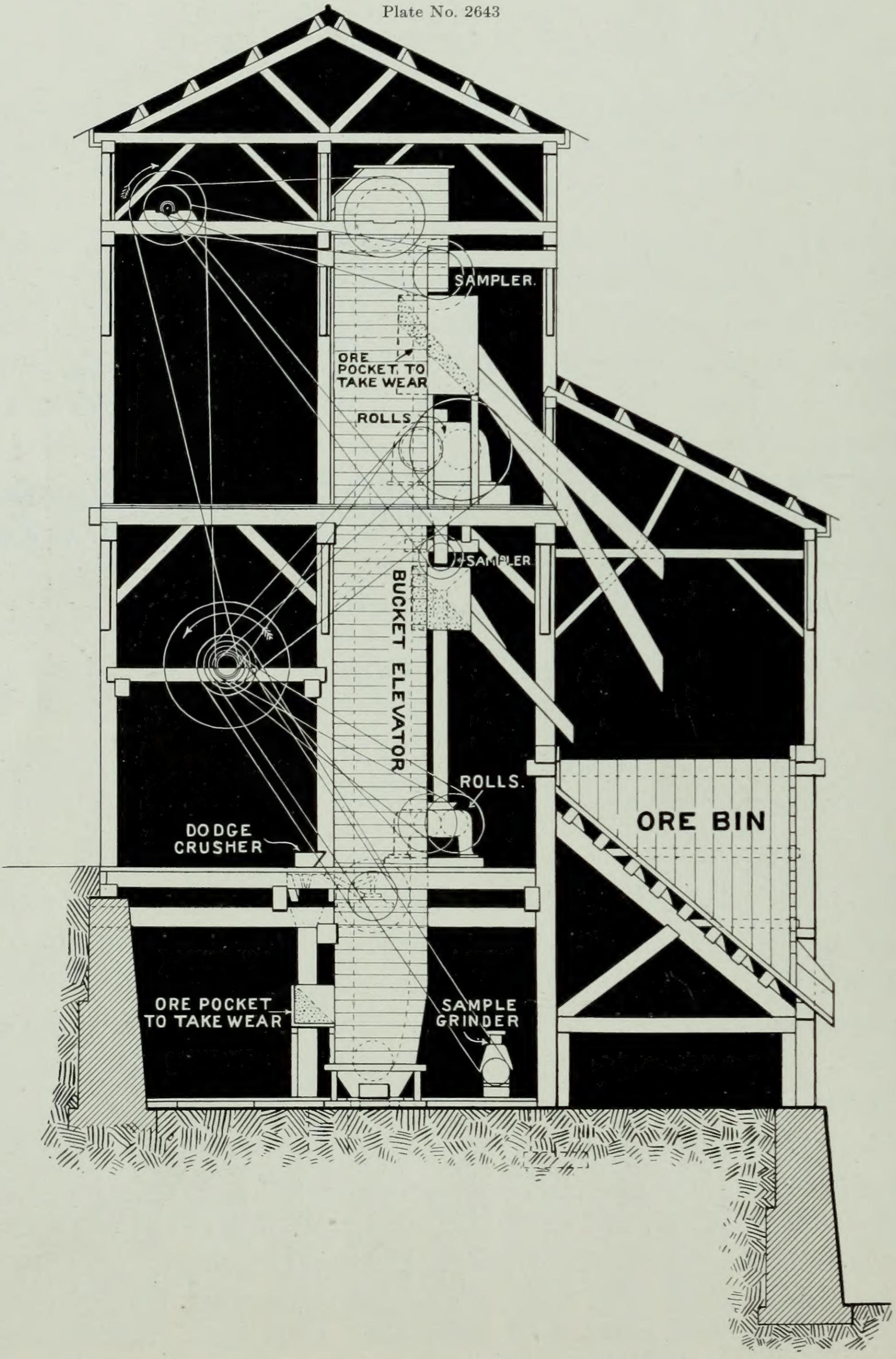
An automatic sampling plant, ordinarily rated at a capacity of about 5 tons per hour, is shown in section and plan on pages 8 and 9, respectively. The course of the ore through this plant is as follows:

The ore is first fed into a 7″ x 10″ Blake Crusher, which reduces it to about 2 inches in size. From there it passes to an 8-inch bucket elevator, which raises it to a 42-inch Snyder Automatic Sampler in the upper part of the mill. This sampler makes a 20 per cent cut, the rejections passing to a bin in the front of the plant and the sample falling to a pair of 24″ x 8″ rolls. These rolls reduce the sample to about one inch in size. From them it passes to a 6-inch bucket elevator. The elevator raises it again to the top of the mill to a 27-inch Snyder Automatic Sampler. This sampler makes a 20 per cent cut, the rejections passing to a bin in the front of the plant and the sample falling into a pair of 12″ x 12″ rolls. These rolls reduce the sample to about ¼ inch in size and it falls to a 12-foot square steel-covered quartering floor below. There the sample is quartered down to the desired size and the final sample reduced in a Style "B" Sample Grinder.

This mill is entirely automatic in its operation. It gives a 40-lb. sample on the floor plates for each 1,000 lbs. of ore passed through.

99528

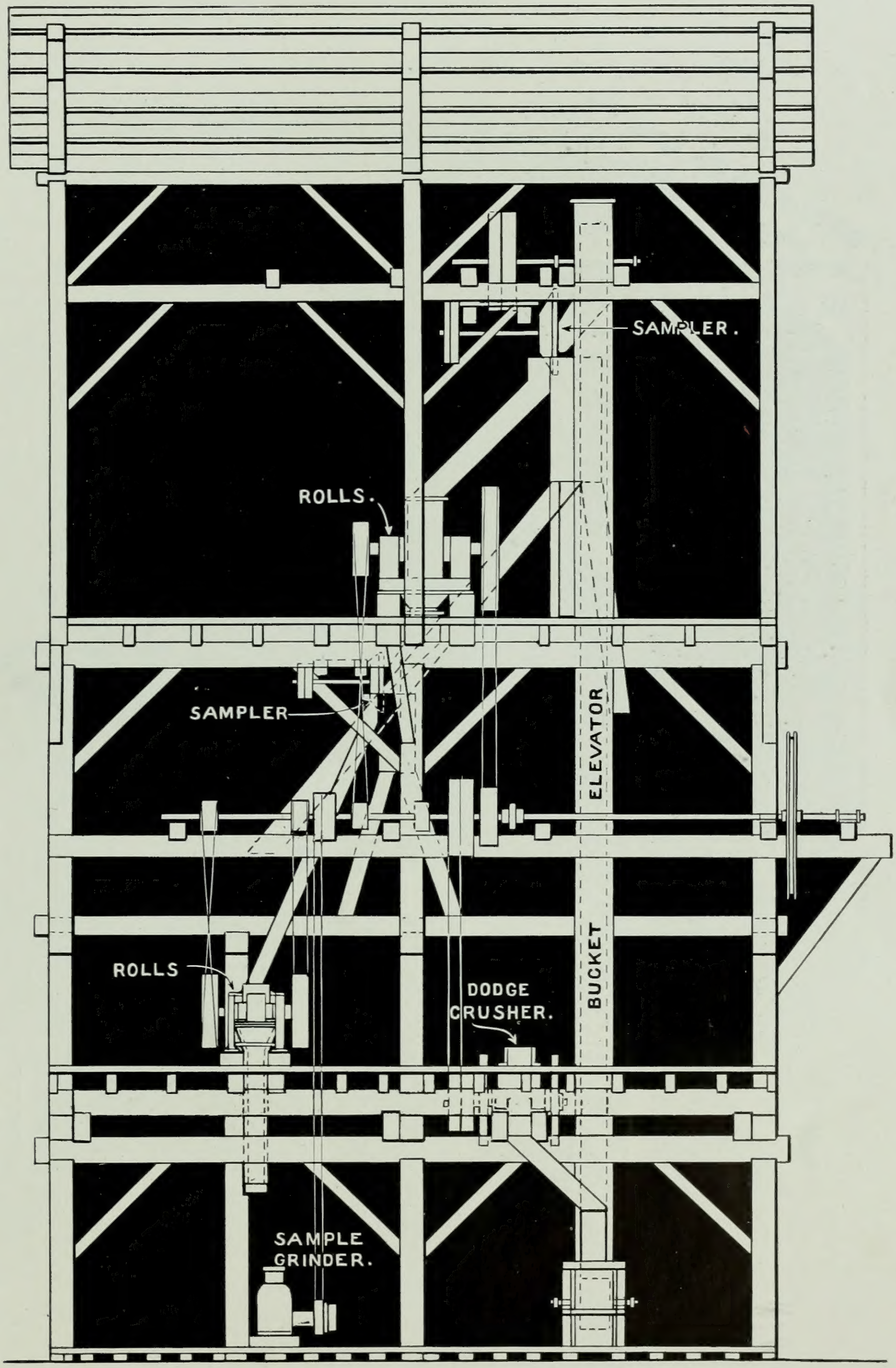
Plate No. 2643



Automatic Sampling Plant
(Side Elevation)

85529

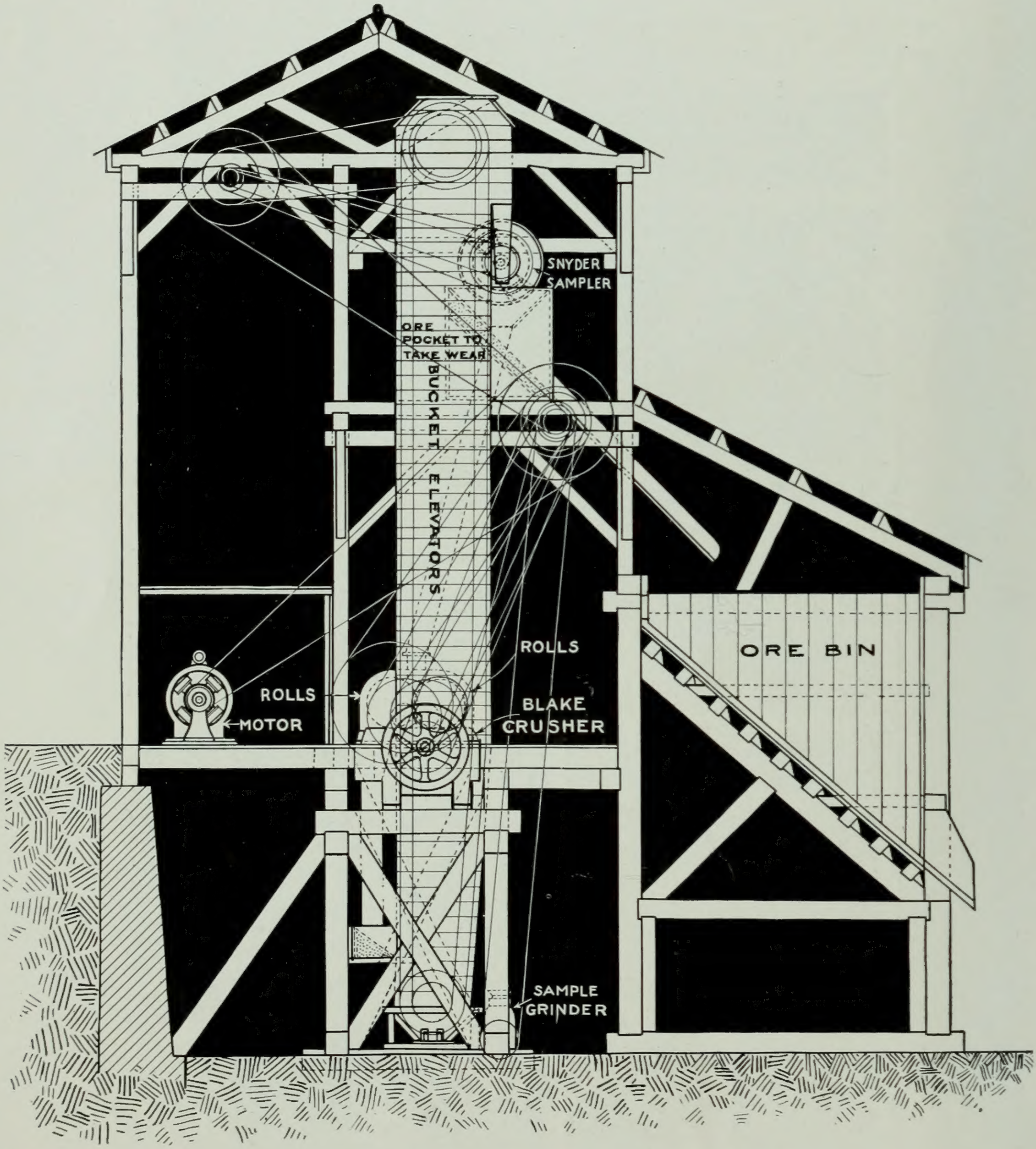
Plate No. 2648



Automatic Sampling Plant
(Front Elevation)

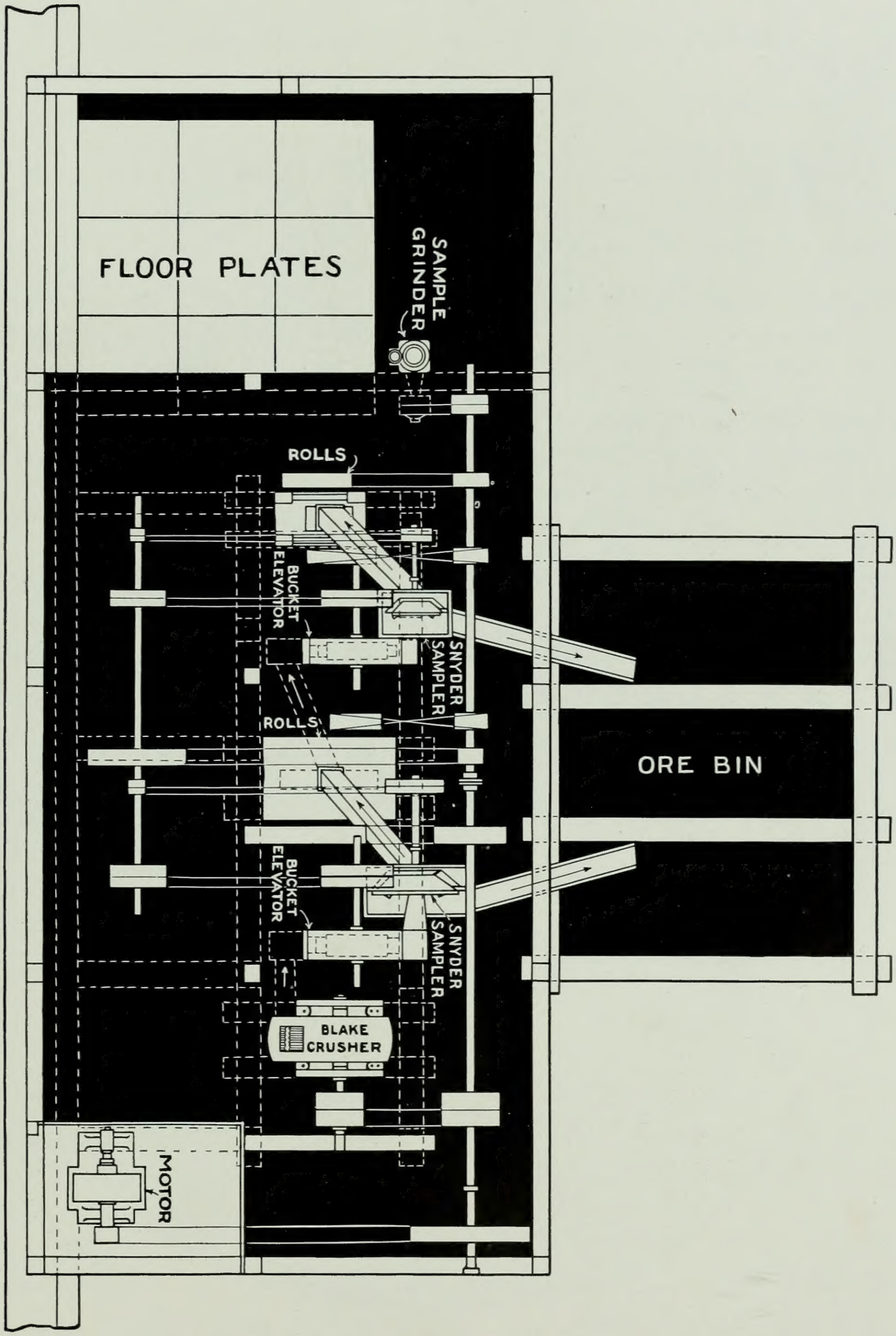
530

Plate No. 2647



Small Automatic Sampling Plant
(Elevation)

Plate No. 2649



Small Automatic Sampling Plant
(Plan)

GATES GYRATORY ROCK AND ORE BREAKERS

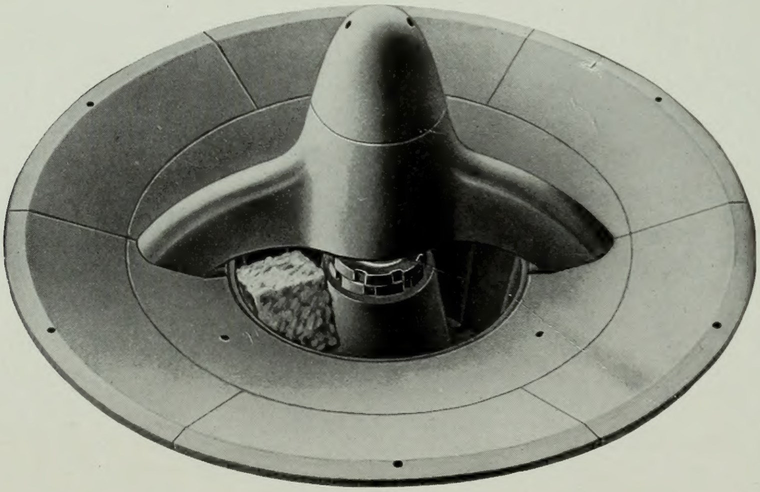
The gyratory rock breaker was invented to overcome the objections to the jaw crusher, such as limited capacity, product not uniform, and inability to stand as severe strains. From the time of the first application of the gyratory principle to crushing work, the Gates Gyratory Rock and Ore Breaker has been made by the Allis-Chalmers Manufacturing Company or the Gates Works, which it has absorbed.

During this whole time the development of the machine to meet ever-growing demands has never been permitted to lag. More than seven thousand Gates Rock Breakers are now in use. They are to be found in every part of the world.

Some of the Gates Breakers "first built" are still in regular use at the older metallurgical works. No better proof could be had that these machines were well designed, well built and made of the proper materials. With their success came demands for machines of higher capacity and capable of breaking rock of any degree of hardness.

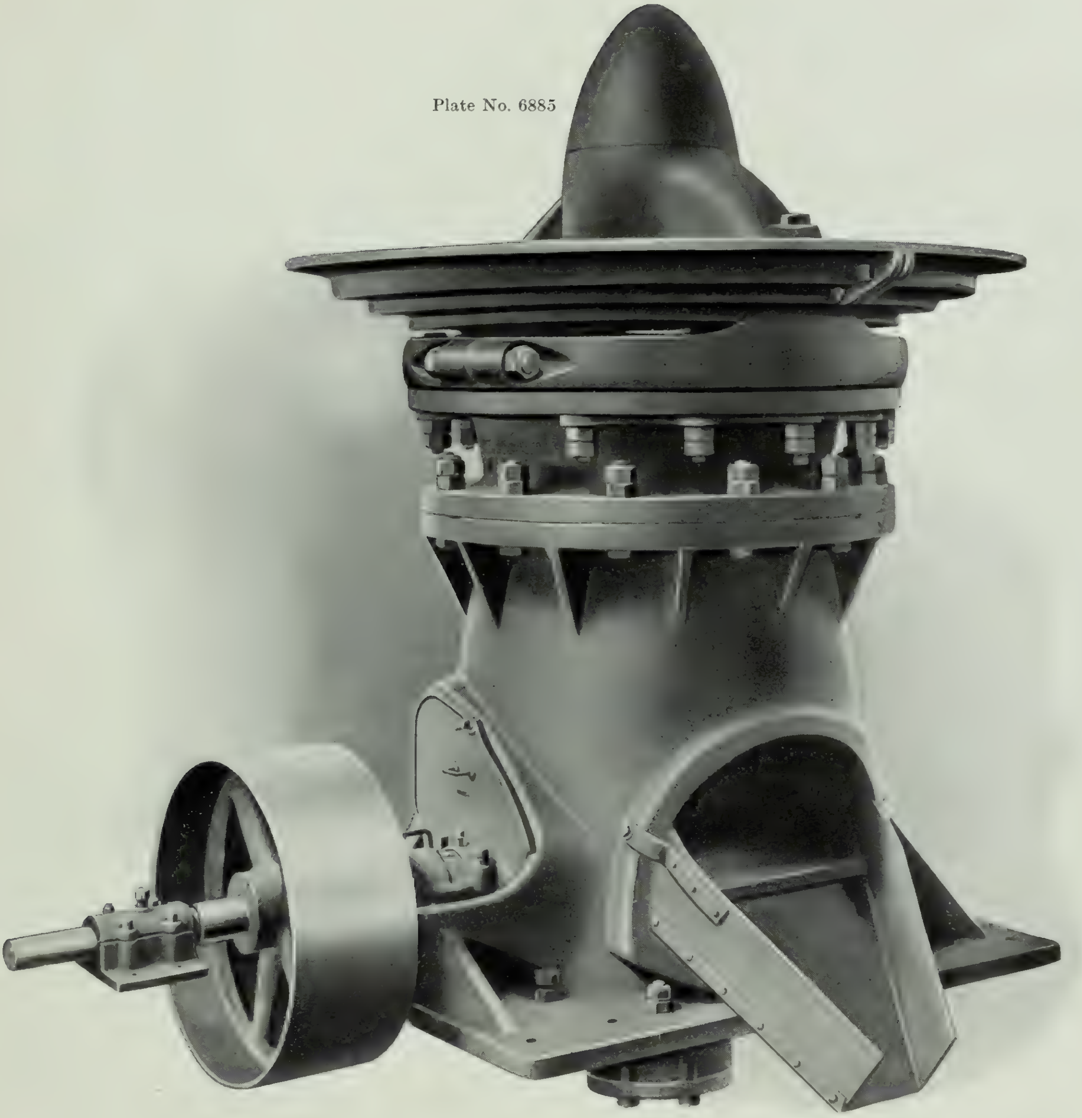
Every demand has been met by the Style "K" Breaker, which is fully described in a separate bulletin. Every part of this machine has been carefully considered in the light of years of experience to keep it up-to-date, and where no changes were made, it was because the older form has proved its competency for the work.

Plate No. 1437



The Spider and Hopper

Plate No. 6885



Style "K" Left-Hand, Right Angle Driven Gates Rock and Ore Breaker (Front View)

DIMENSIONS, WEIGHTS, CAPACITIES AND REQUIRED POWER, STYLE "K"

Size	Dimensions of Each Receiving Opening About	Weight of Breaker	Capacity per Hour, According to Character of Rock or Ore, in Tons of 2000 Pounds, to Pass through a Ring of								Smallest Sizes of Product of Machine	Dimensions of Driving Pulley	Revolutions of Driving Pulley	Horse Power Required
	Inches	Pounds	1½	1¾	2	2½	3	3½	4	5	Inches	Inches		
4	8 x 30	22,000	15	20	25	30	40	......	......	......	1½	32 x 12	400	14 to 21
5	10 x 38	32,800	......	30	40	50	60	70	......	......	1¾	36 x 14	375	22 to 30
6	12 x 44	48,000	......	......	50	70	80	90	......	......	2	40 x 16	350	28 to 45
7½	14 x 52	68,100	......	......	......	80	90	100	120	......	2½	44 x 18	350	50 to 75
8	18 x 68	103,000	......	......	......	......	......	130	150	......	3½	48 x 20	350	70 to 110
9	21 x 76	155,000	......	......	......	......	......	......	250	300	4	56 x 20	300	100 to 150
10	24 x 82	Information Furnished on Application												
12	27 x 88													
18	36 x 102													
21	42 x 114													
24	48 x 125													

POWER—The estimate of power required is for Breakers only, no allowance having been made for Elevators or Screens.

NOTE—Sizes smaller than No. 4 are not made in "K" style. For these sizes refer to Style "D" Bulletin.

RIGHT ANGLE DRIVEN GATES BREAKERS

Gates Gyratory Rock and Ore Breakers are so constructed as to permit of their being driven at right angles to the discharge opening of the machine. This is often desirable, as it permits of the compact arrangement of the machinery of a plant or allows for one breaker to be set so as to discharge directly into another without the employment of bevel gears, special countershafts or other transmitting machinery. It often facilitates the direct belting of the machine from the engine or main line shaft.

The Gates Breaker is the only machine of its kind which can be made with the right angle drive. They are made with the band wheel placed either to the right or to the left side of the breaker. In ordering, this position is determined from the point where one stands to look into the spout of the machine.

WHY A STYLE "K" GATES ROCK AND ORE BREAKER IS BEST:

REQUIRES LEAST POWER TO OPERATE. This machine will break more rock per horse-power than any other ever made.

EASE OF FEEDING. The style of spider gives large and unobstructed feed openings, which do away with clogging and consequent loss of time in working.

UNOBSTRUCTED DISCHARGE. No limit of capacity at this point.

HIGHEST RANGE OF ADJUSTMENT. Provides ease in changing the sizes of product and great facility for taking up wear of the breaking surfaces.

TOP SUSPENSION OF SHAFT. Prevents the bottom bearings running hot under the hardest work and makes adjustments easy.

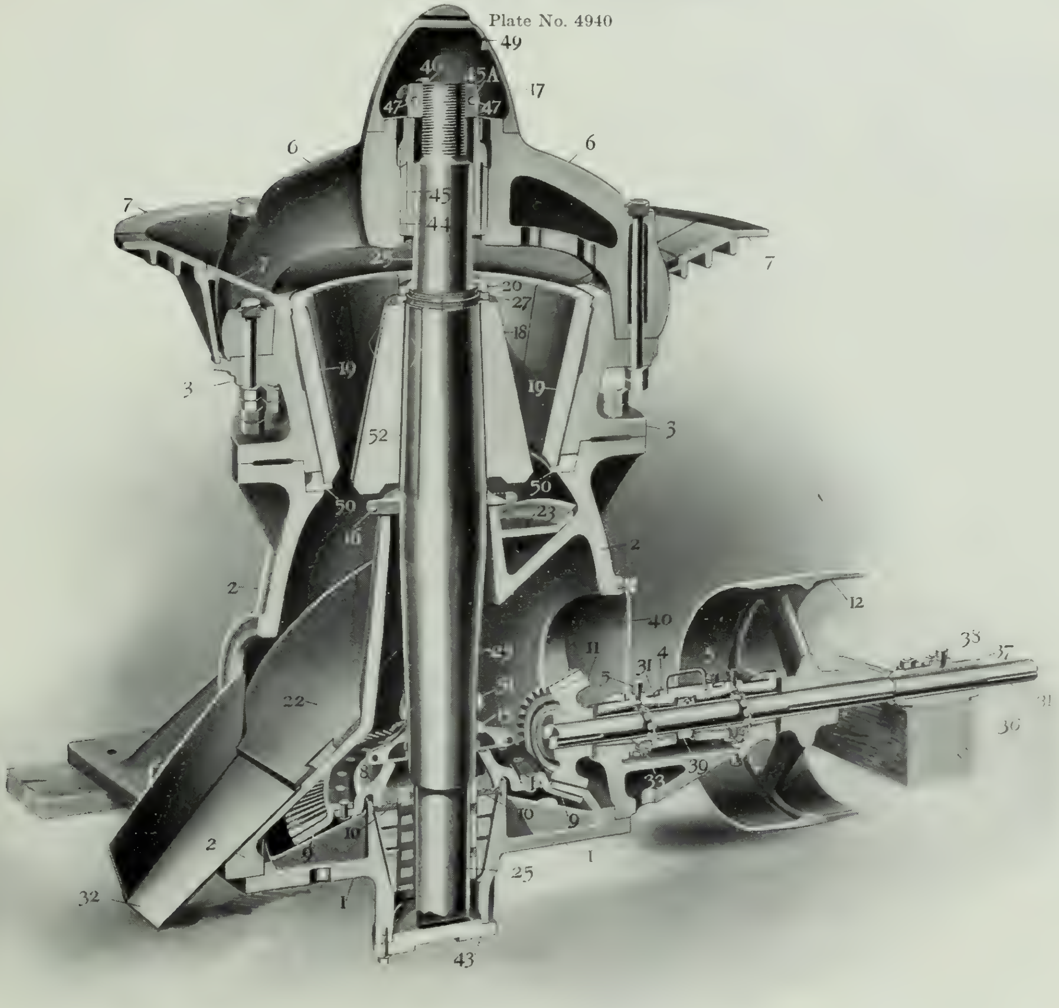
STRENGTH AND RIGIDITY. Due to the liberal proportioning of the parts.

COOL RUNNING. Because of extra large bearings.

EASE OF MAINTENANCE. Every detail has been carefully worked out and every part particularly designed to do its work. Each part is accessible.

CONCAVES CAN BE CHANGED WITHOUT DISTURBING THE SPIDER. Impossible with any other kind of breaker.

Plate No. 4940



General Sectional View of Style "K" Gates Rock and Ore Breaker

LIST OF PARTS FOR STYLE "K" GATES ROCK AND ORE BREAKER

1 Bottom Plate
2 Bottom Shell
3 Top Shell
4 Bearing Cap
5 Oil Nipple and Cap
6 Spider
7 Hopper
8 Eccentric
9 Bevel Wheel
10 Brass Wearing Ring
11 Bevel Pinion
12 Band Wheel
15 Oil Bonnet
16 Dust Ring
17 Dust Cap
18 Head
19 Concaves
22 Wearing Plates
23 Upper Wearing Plate
25 Main Shaft
26 Upper Ring Nut
27 Lower Ring Nut
31 Countershaft
32 Spout
33 Oiling Chain
36 Outboard Bearing Base
37 Outboard Bearing Cap
38 Outboard Bearing Oil Nipple and Cap
39 Countershaft Collar
40 Dust Door
43 Bottom Plate Cover
44 Spider Bushing
45 Shaft Bushing
45A Shaft Split Nut
46 Gib Key for Split Nut
47 Clamp Bolts for Split Nut
49 Oil Plug in Dust Cap
50 Concave Supporting Ring
51 Main Shaft Collar
52 Zinc Keys—Poured in Place by Owner
Key Concave
Narrow Key Concave
Babbitting Sleeves
Babbitting Mandrel for Countershaft Bearing
Side Dust Door
Side Dust Door Handle
Split Nut for Clamp Bolt
Oil Feed and Drain Pipe
Oil Pump
Telltale Pipe for Eccentric
Filling Pipe
Telltale Pipe for Countershaft
Headcenter or Core
Mantle

CRUSHERS OF THE MOVABLE JAW TYPE

While no form of jaw crusher is equal in essential merit to the Gates Gyratory Breaker there are conditions that would justify a customer's preference for a jaw crusher. This is notably the case when initial expenditure is a factor of paramount importance, or when a small machine with a large receiving opening is required and great capacity is non-essential.

The best known and most successful crushers of the jaw type are, beyond doubt, the Blake Stone and Ore Crusher and the Dodge Crusher. These have been built in the shops of Allis-Chalmers Manufacturing Company for more than four decades. They are the best machines of their class that wide experience, skill and unsurpassed engineering and manufacturing facilities can produce. The same class of material enters into their construction that is employed in building the Gates Gyratory Breakers and an equal degree of care has been bestowed upon perfecting each detail of construction. Before the advent of the Gyratory Breaker, the "Blake" was considered the most satisfactory type of crusher upon the market and even at the present time its friends are legion. The principle involved in the operation of either Blake or Dodge Crushers is practically the same, but its application is somewhat different with a resultant change in the character of the product.

Blake and Dodge Crushers effect the reduction of the material between two jaws, which are protected from wear by renewable plates. One of the jaws is stationary and the other movable. In the Blake, the movable jaw is suspended or pivoted at the top and the reciprocating motion is imparted to the swinging jaw by means of two plates which, in conjunction with a vertical pitman operated by an eccentric on the driving shaft, form a toggle joint. By means of the leverage thus gained the crushing force is applied with great power.

In the Dodge Crusher the movable jaw is pivoted at the bottom and prolonged at the back, thus forming a simple lever operated by an eccentric shaft to which the lever is connected by a pitman.

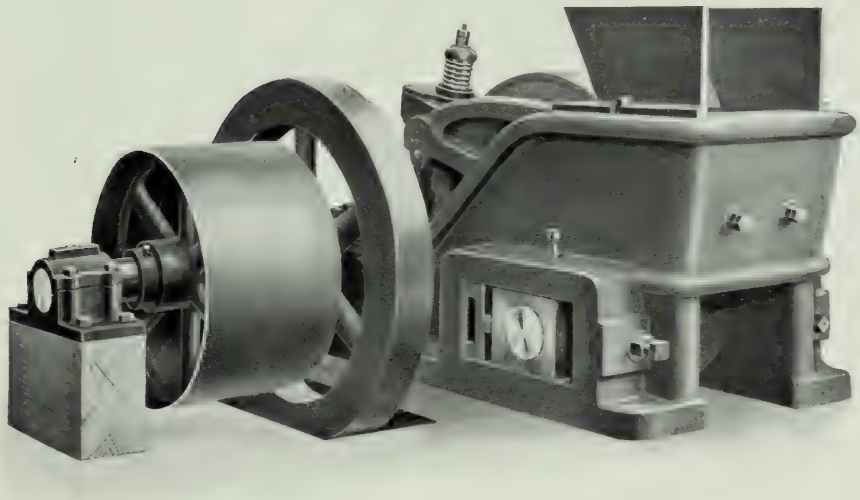
In comparing the relative merits of the two machines, it is obvious that, as the width between the jaws at the point of discharge in the Dodge Crusher remains more constant, a finer and more uniform product can be obtained than from the "Blake," but it is inferior to the latter in capacity. Dodge Crushers are admirably adapted for the reduction of product of a Gyratory Breaker adjusted for coarse work, the fine product thus obtained in large quantities being very suitable for feeding rolls or other pulverizers.

For the preliminary crushing of ore in sampling mills of small or medium capacity, Blake Crushers have been extensively used with satisfactory results. By reason of the wide range in the character of the service rendered by the "Blake," "Dodge," "Gyratory" and the other forms of breaking the crushing machinery built and sold by the Allis-Chalmers Manufacturing Co., this Company is enabled to anticipate every conceivable condition or requirement in the reduction of ore, rock or other hard or brittle substances. The Blake and Dodge Crushers, as built by the Company, are thoroughly up-to-date, contain late improvements and are secondary only to the "Gyratory."

In the manufacture of machinery of this character the practice too often resorted to, of sacrificing strength and careful finish to enable the manufacturer to compete more successfully with those possessing greater facilities, resources and experience, is opposed to the customer's interests and can not be too severely condemned.

ALLIS-CHALMERS DODGE CRUSHER

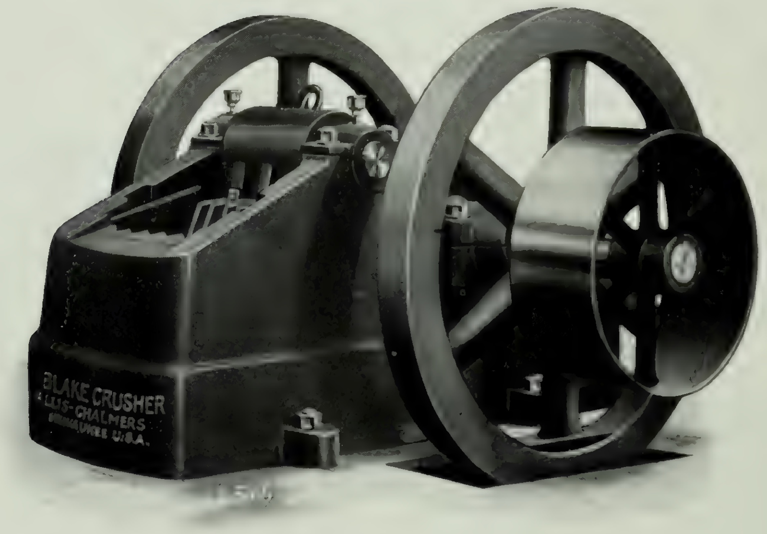
Plate No. 4669



PRINCIPAL PARTICULARS OF ALLIS-CHALMERS DODGE CRUSHERS

Size of Jaw Opening	Horse-Power Required	No. of Tons Per Hour, Nut Size	Revolutions Per Minute	Weight, Complete	Weight of Heaviest Piece
4″ x 6″	3	½	300	1100 lbs.	310 lbs.
7″ x 9″	6	1½ to 2½	300	3250 lbs.	1035 lbs.
7″ x 9″ Sectional	6	1½ to 2½	300	3350 lbs.	250 lbs.
8″ x 12″	10	3 to 5	300	5900 lbs.	2000 lbs.
11″ x 15″	15	6 to 8	250	13500 lbs.	4015 lbs.

Plate No. 6516



Allis-Chalmers "Type B" Blake Crusher

SIZES, CAPACITIES, ETC.

No.	Size or Receiving Capacity	Capacities in Tons per Hour										Approx. Horse-power Required	Size of Driving Pulley	R.P.M.	Weight Complete	Extreme Dimensions, Including Shafts		
		Size of Product																
		½"	¾"	1"	1½"	2"	2½"	3"	4"	5"	6"					Length	Breadth	Height
*2	10"x 7"	...	1½	2½	4	5						7	24"x8½"	250 to 275	6,500	4'- 8"	4'- 2¼"	3'-2⅛"
3	15"x 9"			6	8	10	12					10	24"x11"	250 to 275	12,000	5'- 5"	5'- 1⅝"	3'-7⅝"
4	20"x10"				10	15	17½	20				15	30"x13"	250 to 275	15,000	6'- 1"	5'-11¾"	4'-2"
5	24"x12"					20	25	30	35			25	2–36"x13"	250 to 275	25,000	6'-10½"	8'- 0"	4'-7"
6	30"x18"						30	37½	45	50		40	2–42"x13"	250 to 275	47,000	8'-11"	9'- 3"	5'-5½"
7	36"x24"							60	72	85	100	60	2–42"x15"	250 to 275	80,000	10'- 7"	10'- 8"	9'-8"

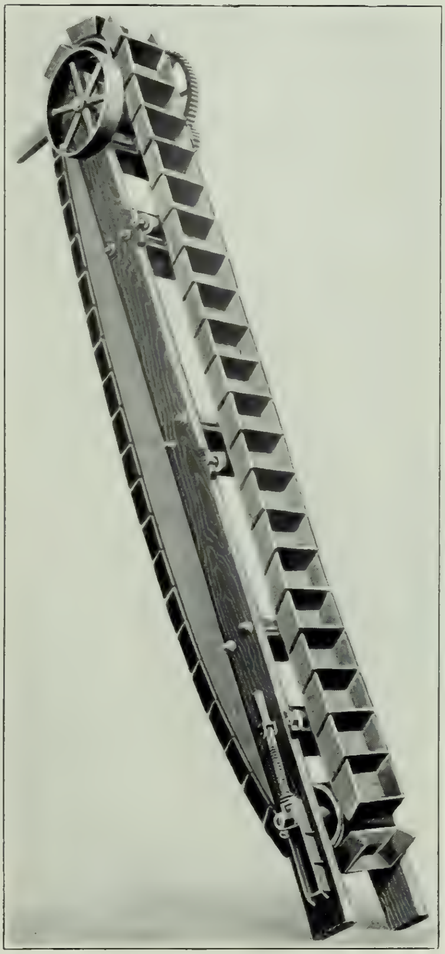
NOTE—Crushers Nos. 5, 6 and 7 have two Driving Pulleys.

Capacities given are approximate and may vary either way according to the character of material to be broken, and depend on distance the jaws are set apart and the speed. Hard stone or ore that breaks with a snap will go through faster than sandstone.

*The 10" x 7" size crusher is made in sections, packed in 150 lb. packages as far as possible, for transportation in mountainous districts. Total weight, approximately 6,000 lbs. The weight of the heaviest piece is 360 lbs.

ELEVATORS

Plate No. 1321



Geared Elevator, Left-Hand Driven

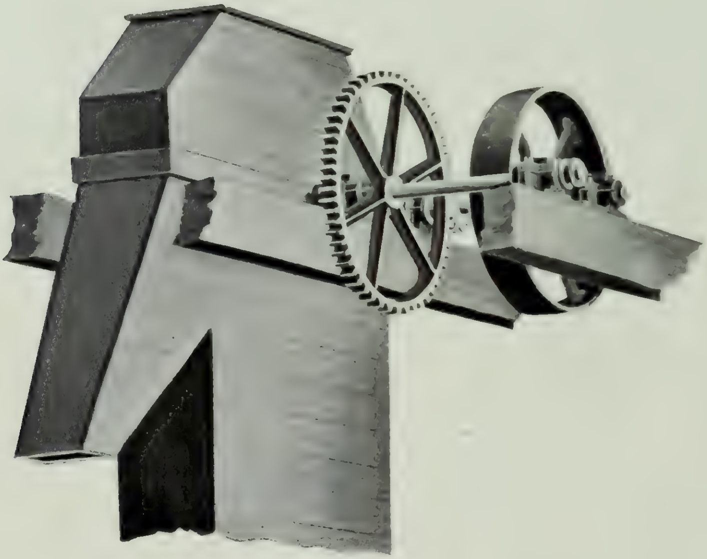
The Gates Style "B" Elevator is of exceedingly heavy construction throughout. The buckets are of the continuous type. They are mounted on an extra heavy rubber belt. The head and foot pulleys are very heavy and mounted on large shafts running in long boxes. For elevators under 30-foot centers the head pulley is driven direct. For elevators over 30-foot centers it is geared as shown by plate No. 1321. The foot pulley of all elevators is provided with take-up boxes. We furnish either the iron work and bucket belt only for these elevators, or the elevator complete with a wood frame as shown by plate No. 1321, as desired.

DIMENSIONS AND WEIGHTS OF GATES STYLE "B" ELEVATORS

Head	Size of Elevator	Size of Breaker	Distance Btw. Centers	Size and Gauge of Buckets	Width of Belt	Weight	Revolutions of Pinion Shaft on Geared Head	Revolutions of Head Shaft
			Feet		Inches	Pounds		
Single Heads to 30 ft. in Length	2	1 and 2	30	9 x 9 No. 16	10	2200	162	32
	3	3	30	11 x 9 No. 16	12	2600	162	32
	4	4	30	13 x 10 No. 14	14	2800	160	32
	5	5	30	16 x 11 No. 14	18	3500	168	27
Geared Heads	6	6	30	18 x 12 No. 12	20	4700	139	23
	7½	7	30	24 x 13½ No. 12	26	8000	132	21
	8	8	30	30 x 15 No. 10	32	11300	108	19
	9	9	30	36 x 16 3-16"	38	15100	100	18

For elevating material from the primary crusher, in sampling mills of moderate or large sizes, and especially where the Gates Rock and Ore Breaker is used primarily, the Gates Style "B" Elevator is recommended. This elevator was designed originally for use in stone crushing plants where the service is severe and continuous. In such work it has been found superior to all other designs. This elevator is used in many sampling mills, and in every case it has given entire satisfaction.

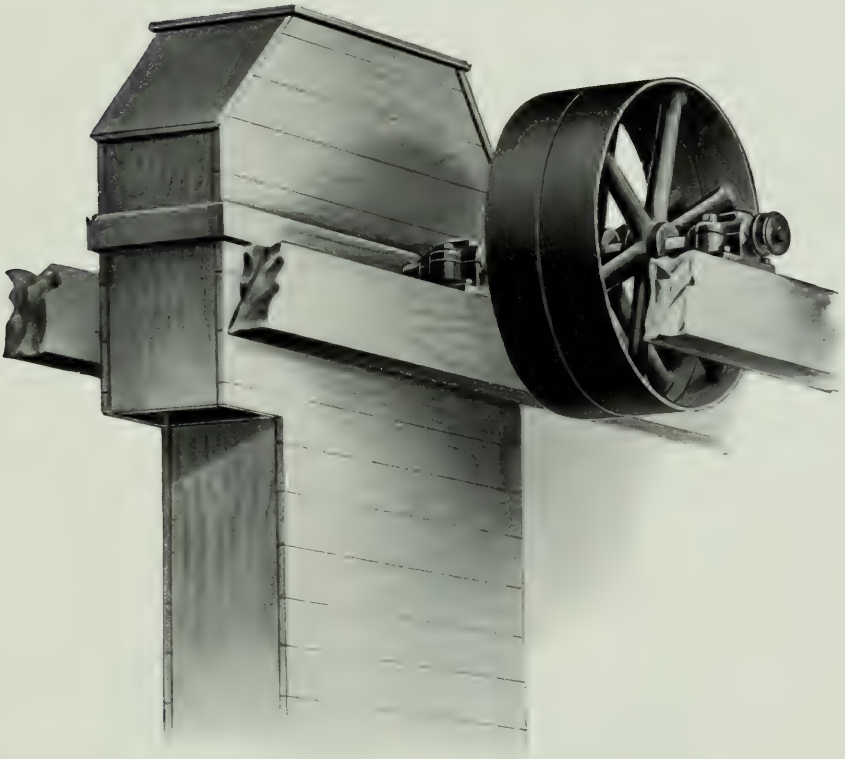
Plate No. 3233



Geared Elevator Head with Tight Driving Pulley only

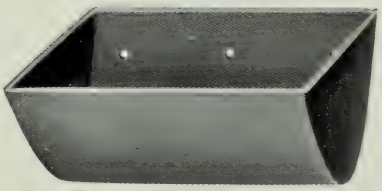
For primary elevators in small sampling plants and secondary elevators in large mills, we recommend our standard bucket elevator, which consists of heavy malleable iron buckets mounted on heavy rubber belts. The iron work for these elevators is of extra heavy design throughout. For short lifts the heads of these elevators are driven direct with tight and loose pulleys, as shown by plate No. 409 on following page. For high lifts they are geared as shown by plate No. 3233.

Plate No. 409



Plain Elevator Head with Tight and Loose Driving Pulleys

Plate No. 355



Bucket
and
Bolt

Plate No. 356

Plates 355 and 356 illustrate the malleable iron buckets used for these elevators and the large headed bolts used for attaching the buckets to the bucket belt.

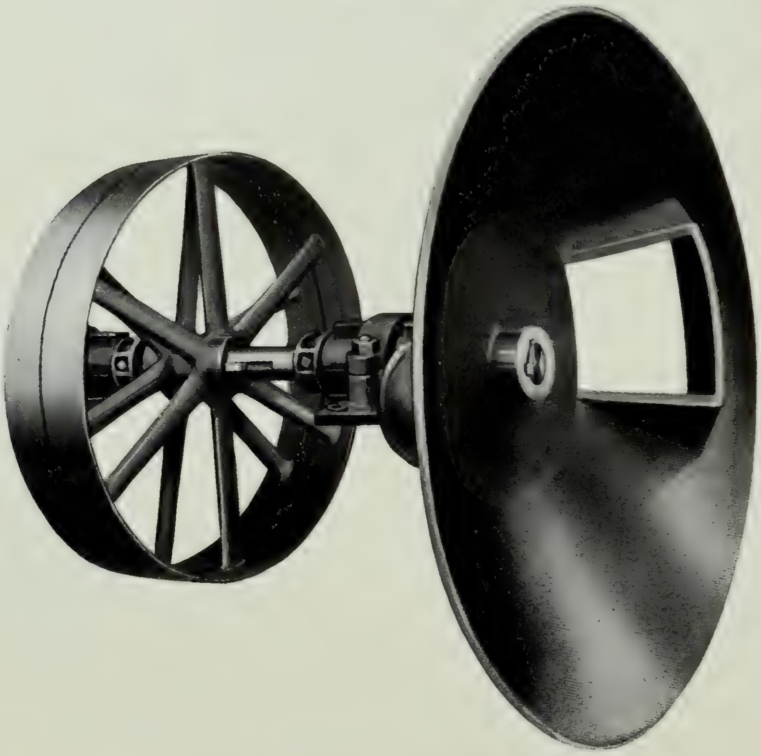
SNYDER AUTOMATIC SAMPLER

The Snyder Automatic Sampler illustrated by plate No. 773 is without doubt the most simple and efficient automatic sampling machine ever devised.

As plate 773 shows, this Sampler consists merely of a circular casting shaped much like a miner's gold pan, having one or more openings (according to per cent sample desired) in its sloping flange, mounted on the end of a horizontal shaft provided with tight and loose driving pulleys.

In operation the sampler revolves 10 to 30 times a minute, the speed depending upon the size of the sampler itself and the size of the material being handled. The material to be sampled is directed by a spout so as to fall inside of the sloping flange of the sampler. The rejections slide off the flange into a receiving hopper. The sample drops through the opening in the flange as the opening passes under the spout. Nothing could be more simple or effective for the purpose than this machine. A large number of them have been sold and in every instance they are giving absolute satisfaction.

Plate No. 773



Snyder Automatic Ore Sampler

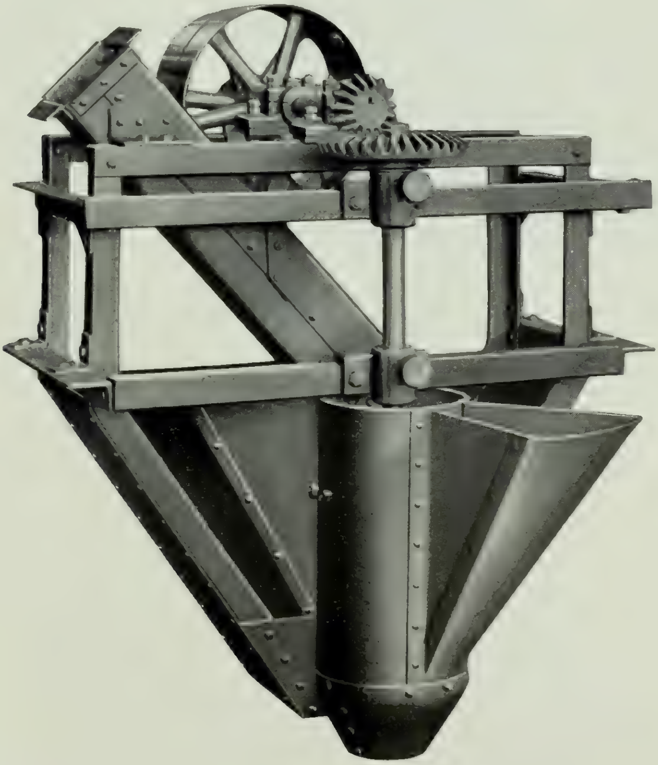
These samplers are built in three sizes, viz., 60 inches in diameter, 42 inches in diameter, and 27 inches in diameter. They are arranged to take samples of any size desired. The frequency of sampling depends, of course, upon the speed.

We do not recommend the handling of material larger than 4-inch with the 60-inch machine; larger than 2½-inch material with the 42-inch machine, or larger than 1-inch material with the 27-inch machine.

VEZIN AUTOMATIC SAMPLER

The Vezin Sampler is one of the best automatic samplers on the market. As shown by plate 10327, it consists of a hollow cylinder with truncated cone made of sheet steel and riveted. The cylinder has secured to same, two or more scoops and is supported upon a vertical shaft, which is driven through bevel gearing, by a horizontal shaft having tight and loose driving pulleys. The entire mechanism is supported in a structural steel frame, at the bottom of which is a hopper to receive rejections from the sampler.

Plate No. 10327



Vezin Sampler

In operation, the cylinder and scoops revolve slowly under the end of the chute carrying the ore to be sampled. The scoops cut out the sample as they pass through the stream of ore. The sample passes through the revolving element, from which it is conducted by a pipe or chute to the next section of the mill. The rejections fall into the hopper, from which they are conducted to mill bins, or otherwise disposed of.

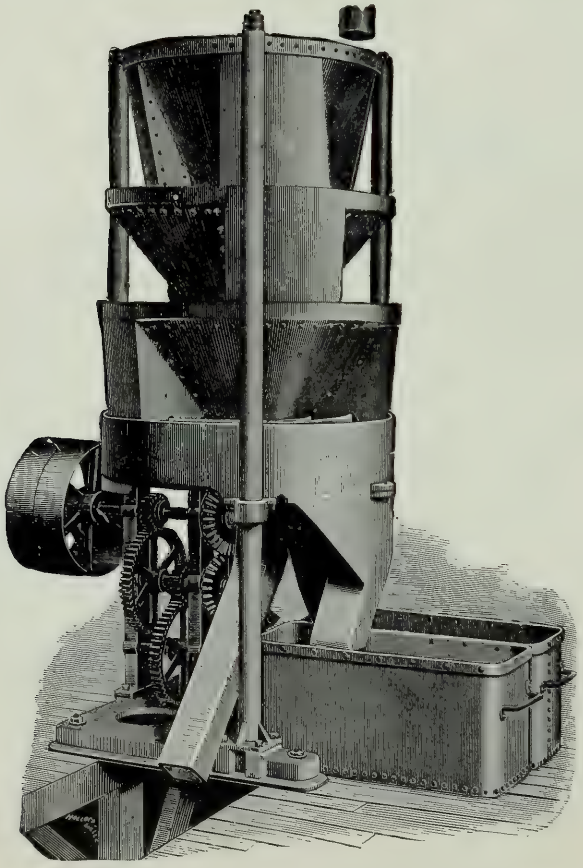
We build these samplers to handle any size of material and to cut any size of sample desired.

THE BRIDGMAN AUTOMATIC SAMPLING MACHINE

The Bridgman Automatic Sampler illustrated by plate 234 was designed by the late H. L. Bridgman after years of practical experience with sampling mills and a careful study of the scientific principles involved in sampling. That this sampler gives admirable results, is evidenced by the large number of them in use.

The Bridgman Sampler gives entirely independent, double (duplicate) samples of every lot of material. It gives three or more cuts (quarterings) on each sample during a

Plate No. 234



The Bridgman Ore Sampling Machine

single passage of the material, thus yielding practically finished samples in one operation. It samples according to the correct practice of taking the entire stream of material for certain predetermined periods of time. It will sample any material that can be crushed, including material carrying up to 10 per cent of moisture.

The machine is entirely self-contained. It is very compact, requires but little power to run and calls for a minimum of repairs and attention. It is adjustable and gives larger or smaller final samples as may be required, according to the different grades and kinds of material handled. We build this sampler in three sizes, viz., "A," "B," and "D."

Size "A" machine gives double samples and three cuts (quarterings) on each sample. It is intended for original samples of any size, and gives final samples of about 1 to 2 per cent of the original weights. It requires a floor space 3 feet by 4 feet and is 7 feet 6 inches high over all. Its average capacity is about 20 tons per hour.

Machine "B" gives a single sample and three cuts. It is intended for smaller original samples than the size "A" machine. It occupies a floor space about 18 inches square and is about 36 inches high. Its average capacity is from two to four tons per hour. Machine "D" is used for laboratory work only and will handle 50 to 100 pounds per hour.

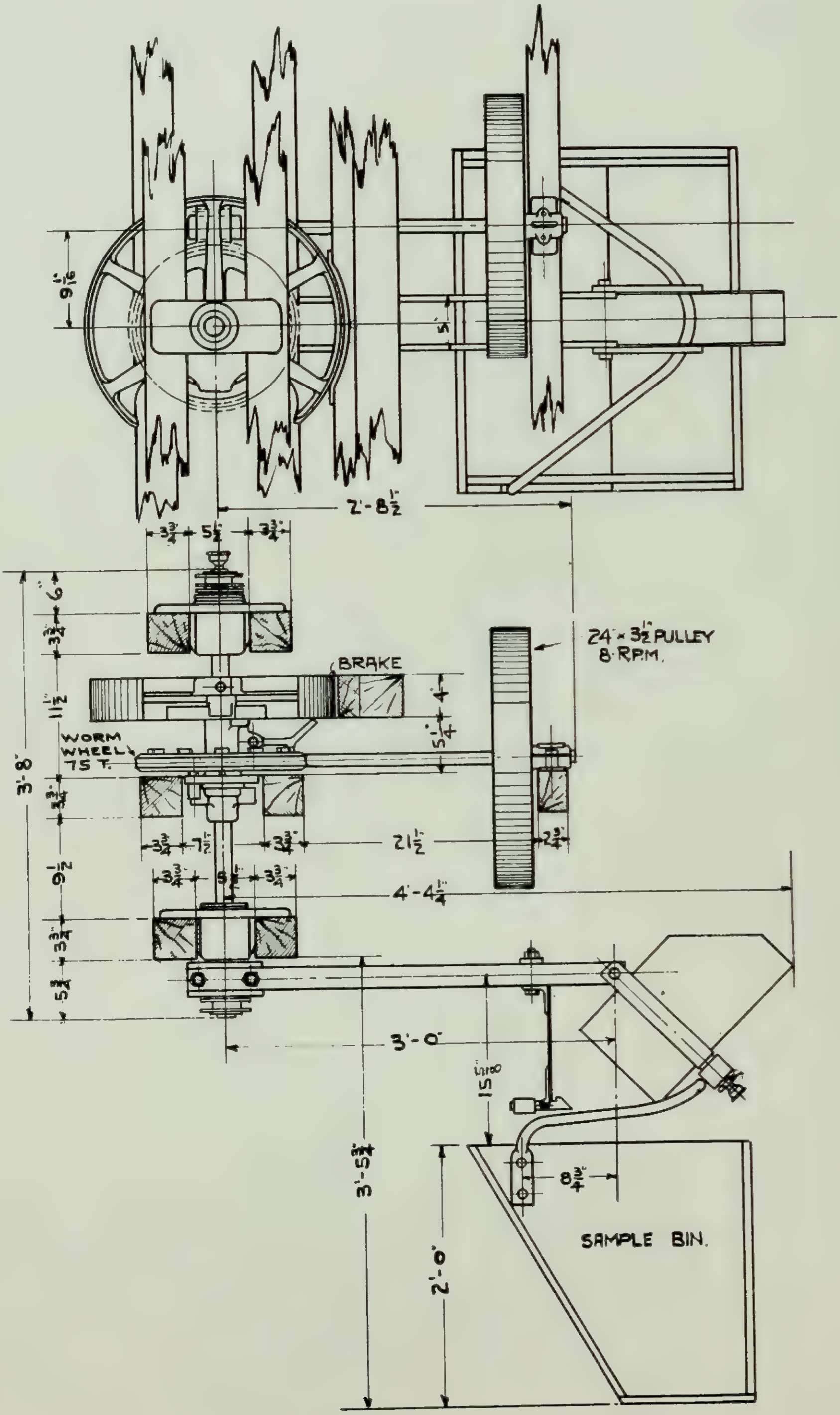
COLE'S AUTOMATIC SAMPLER

The cut on page 24 illustrates Cole's Automatic Sampler. This is an excellent sampler and is used in several large sampling plants in Nevada, also in Alaska and Mexico.

This sampler consists of a cutting arm mounted on a vertical shaft and is intended to cut a sample at intervals by passing the cutter through a stream of ore as it is discharged from a belt conveyor or other similar method. The sampler is driven by a countershaft and worm gearing the ratio of the worm gear being 75 to 1. The speed of the countershaft is about 8 r. p. m. and the driving pulley is 24″ x 3½″. The worm wheel is loose on the vertical shaft and drives the brake wheel through a flat spiral spring. Provision is made for adjusting the amount of tension to be applied on this spring so as to regulate the speed at which the cutter will pass through the ore stream, thereby determining the size of the sample taken. The speed of the machine is constant, and when driving the pulley at 8 r. p. m. it will take a sample about every 10 minutes. The brake wheel has a segment about 90° cut-out and the driving spring rotates this brake wheel until it reaches the point where the segment does not come in contact with the brake, thereby releasing the spring, which causes the cutter to pass rapidly through the stream of ore. The cutter travels on a radius of 3 feet. It is 5 inches wide and is arranged to be discharged automatically by a guide roller on same, which passes over a tripper, discharging the sample into a small sample bin conveniently located for this purpose.

This sampler is suitable for crushed ore not exceeding about 1-inch to 1½ inch size.

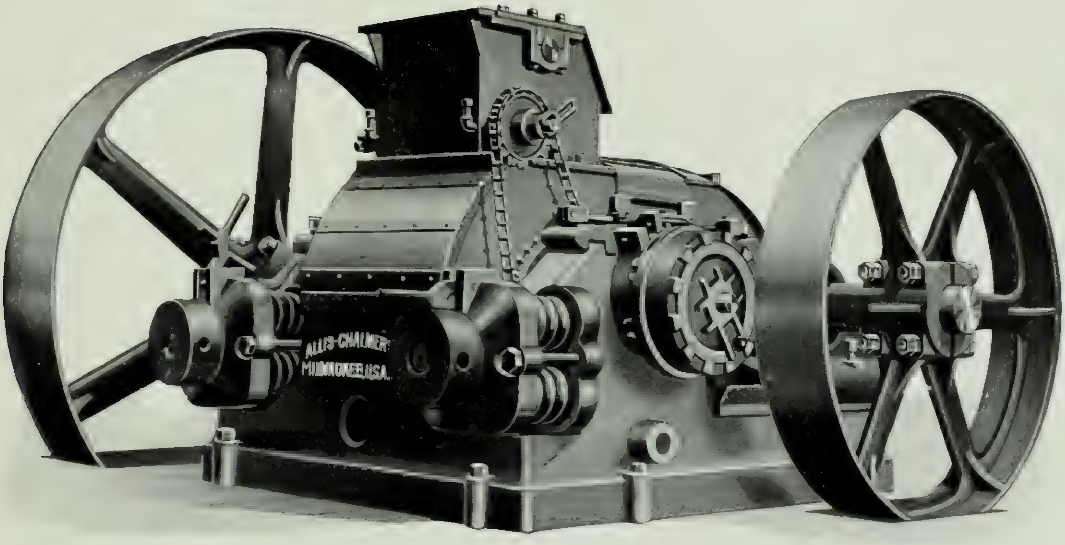
Plate No. 9771



Cole's Automatic Ore Sampler

CRUSHING ROLLS

Plate No. 1389



Style "A" Crushing Roll (Back View)

STANDARD SIZES OF STYLE "A" ROLLS

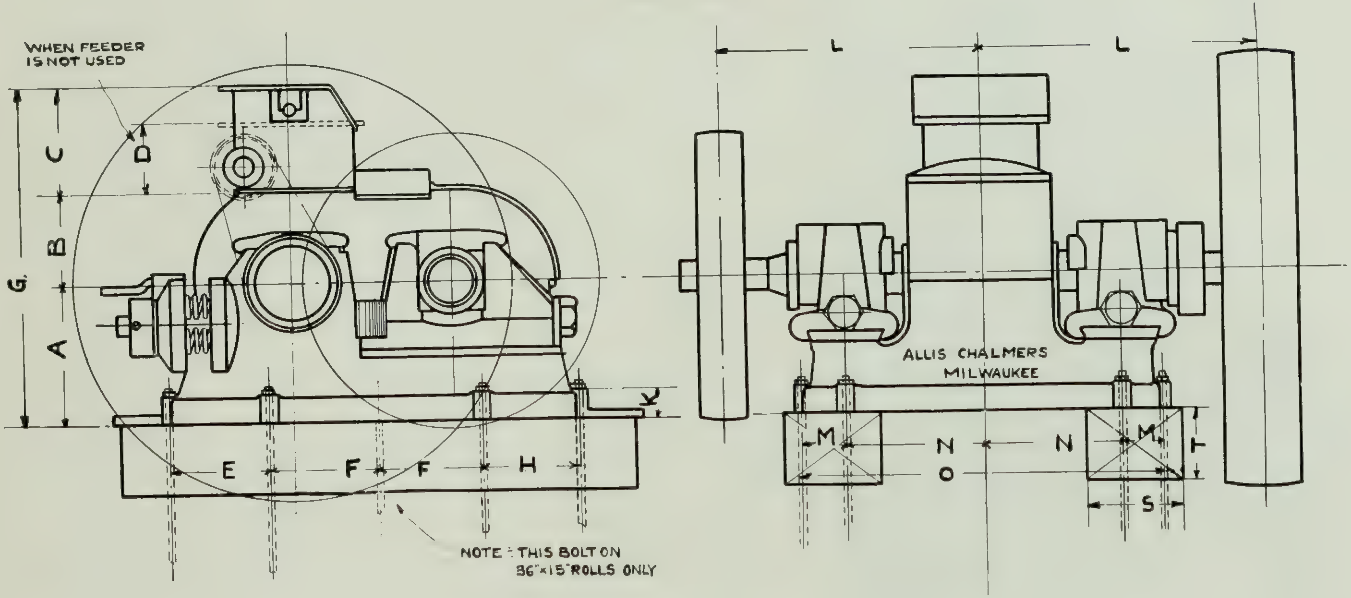
Size of Rolls, inches Diameter by Face	Size of Driving Pulleys, inches Each Roll	Revolutions per Minute	Weight Pounds
26″ x 15″	One 72x12 and one 48x 8	75 to 125	16,500
36″ x 15″	One 96x15 and one 72x 8	40 to 100	33,000
72″ x 20″	One 120x19 and one 84x15	80 to 120	195,000

Style "A" Crushing Rolls are of extra heavy proportions, as indicated by the weights. The main frame of this machine is cored and braced in a substantial manner, with a view of meeting any requirements of stress and work likely to be put upon it. It forms a dustproof case for the machine, reaching up to the center line of roll shaft, its hopper bottom converging to a point to which the spout leading to elevator may be tightly secured and is provided with seats for the dust-housing, the sliding pedestals, and for the rigid roll journal box, and contains and preserves the alignment of all working parts.

All of our crushing rolls are made with specially designed journal boxes, permitting the most perfect lubrication, which results in wearing the same weight of babbitt lining for a period of eight to ten times as long as with the ordinary construction. They are made in one piece—a solid casting, containing a large wearing area, lined with the best babbitt metal. We have discarded the conventional and superfluous cap and provided a large oil chamber in its stead. The roll shaft journal is always accessible in our rolls and may be easily seen and examined. All our high grade roll boxes are made with swivel joints and are interchangeable. The boxes are babbitted over a mandrel in the most convenient manner, entirely separate and independent of the machine. The discharge spout may be rotated, so as to point in any direction. For further details regarding the excellent features of these rolls, see bulletin on "Crushing Rolls."

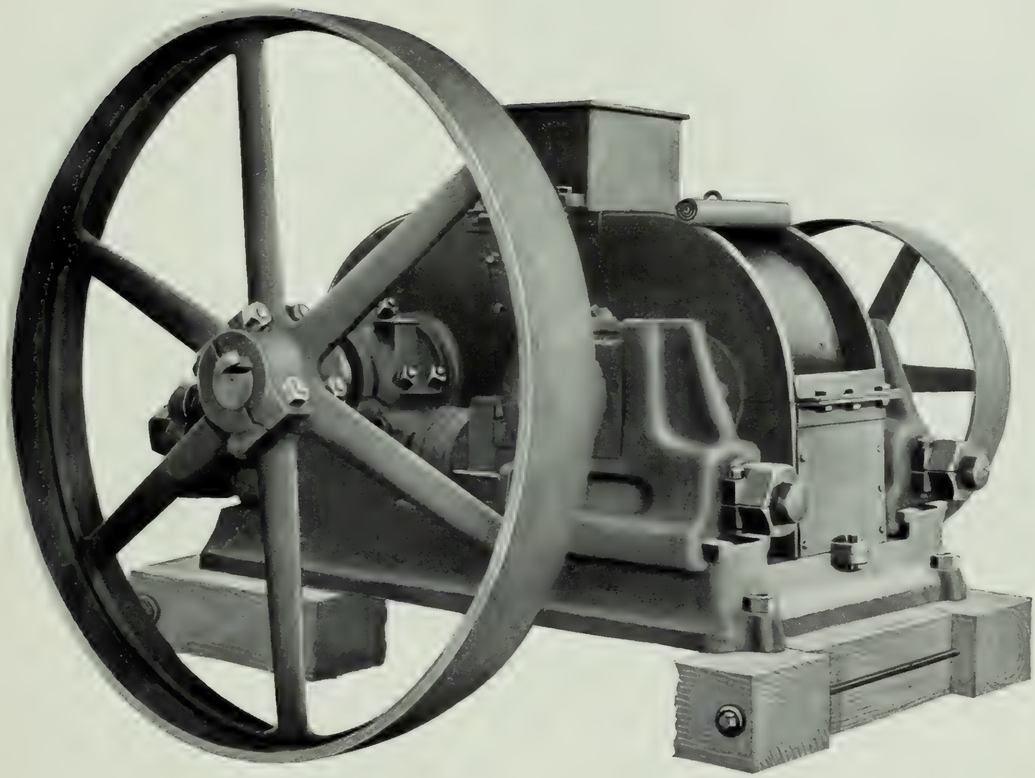
CLEARANCE DIMENSIONS FOR STYLE "A" CRUSHING ROLLS

Plate No. 4243



Size of Rolls	DIMENSIONS OF ROLLS																Wood Frame	
Inches	A	B	C	D	E	F	G	H	K	L	M	N	O	Holding Down Bolts	Large Pulley	Small Pulley	S	T
26" x 15"	23"	15"	17"	12"	10½"	13"	4'-7"	20½"	4¾"	3'-9¼"	6½"	22¾"	4'-10½"	1" x 3'-4"	72" x 12½"	48" x 8½"	16"	12"
36" x 15"	2'- 5"	19"	17"	12"	15¾"	2'- 4"	5'-5"	16½"	4"	4'-6½"	7⅝"	2'- 2⅞"	5'- 9"	1" x 4'-0"	96" x 15½"	72" x 8½"	18"	12"
72" x 20"	4'- 3"	3'-4¼"	. . .	17"	3'-6"	. . . . .	9'-0¼"	3'-6"	6"	7'-6"	22¼"	2'- 6½"	8'- 9½"	2" x 9'-0"	120" x 19"	84" x 15"	42"	10"

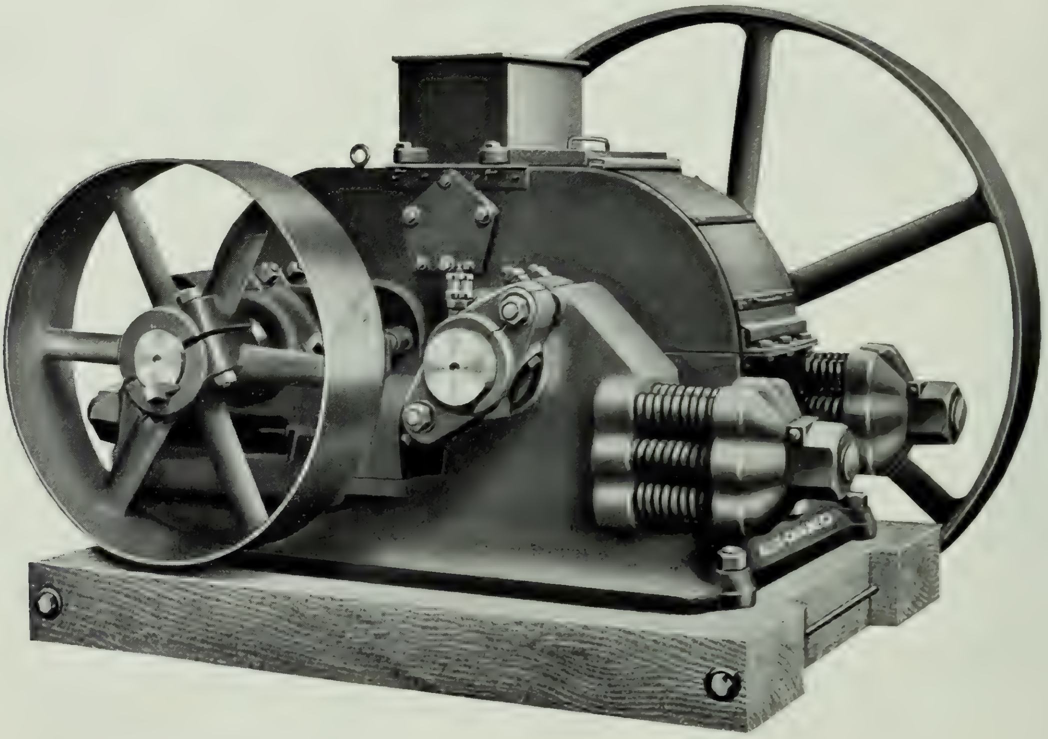
Plate No. 4342



Style "B" Crushing Roll (Front View)

Plates Nos. 4342 and 4338 show our Syle "B" crushing rolls of the latest design. These rolls are of extra heavy proportions, as is indicated by the appended list of weights. The base frames are of a rigid design, made in a single piece, the bearings of the stationary rolls being cast as a part of this same piece. The frames are provided with planed slides for the bearing supports of the movable rolls, these slides being fitted with removable forged steel wearing plates, facilitating repairs and preventing the wear of the actual roll frame by the motion of the sliding boxes. A single heavy forged steel tension rod with a collar solidly forged upon it, passes through each sliding box, and through recesses cast in the frame below the stationary bearing. For an explanation of the many good features of our Style "B" rolls, see bulletin on "Crushing Rolls."

Plate No. 4338



Style "B" Crushing Roll (Back View)

We build our Style "B" Crushing Rolls in four standard sizes (see table below) which sizes we aim to carry in stock, as well as a complete line of repair parts.

STANDARD SIZES OF STYLE "B" ROLLS

Size of Rolls, Inches Diameter by Face	Size of Driving Pulleys	Revolutions Per Minute	Total Weight Pounds
24″ x 14″	One 60″x 8½″ and one 26″x 8½″	100 to 160	14000
30″ x 14″	One 78″x10½″ and one 34″x10½″	75 to 130	18300
36″ x 16″	One 84″x10½″ and one 42″x10½″	50 to 100	24500
42″ x 16″	One 96″x15½″ and one 48″x12½″	45 to 90	36000

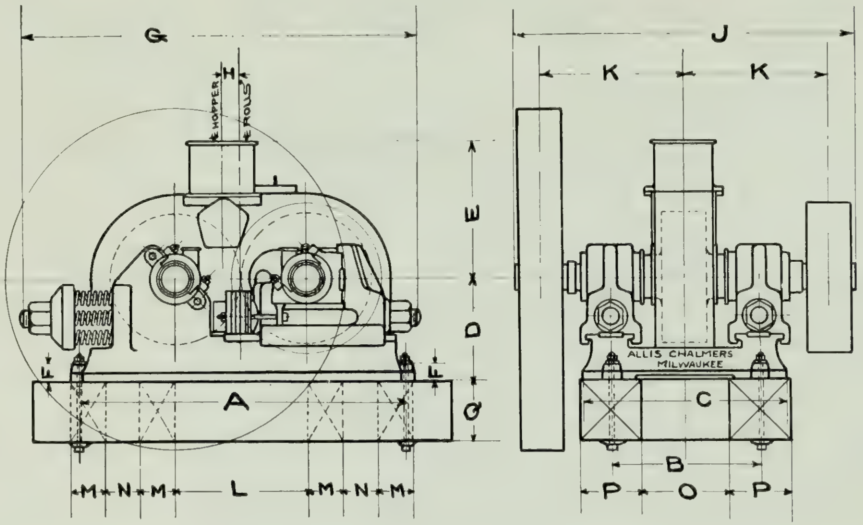
In the following table we give a list of special sizes of our Style "B" Rolls. We are prepared to build any of these sizes upon order, also to furnish repair parts, but we do not aim to carry in stock either the finished machines or repair parts.

SPECIAL SIZES OF STYLE "B" ROLLS

Size of Rolls, Inches Diameter by Face	Size of Driving Pulleys	Revolutions Per Minute	Total Weight Pounds
24″ x 8″	One 60″x 8½″ and one 26″x 8½″	100 to 160	11500
24″ x 10″	One 60″x 8½″ and one 26″x 8½″	100 to 160	12300
24″ x 12″	One 60″x 8½″ and one 26″x 8½″	100 to 160	13100
30″ x 10″	One 78″x10½″ and one 34″x10½″	75 to 130	16500
30″ x 12″	One 78″x10½″ and one 34″x10½″	75 to 130	17400
30″ x 16″	One 78″x10½″ and one 34″x10½″	75 to 130	19000
36″ x 12″	One 84″x10½″ and one 42″x10½″	50 to 100	21500
36″ x 14″	One 84″x10½″ and one 42″x10½″	50 to 100	23000

CLEARANCE DIMENSIONS FOR STYLE "B" CRUSHING ROLLS

Plate No. 4239

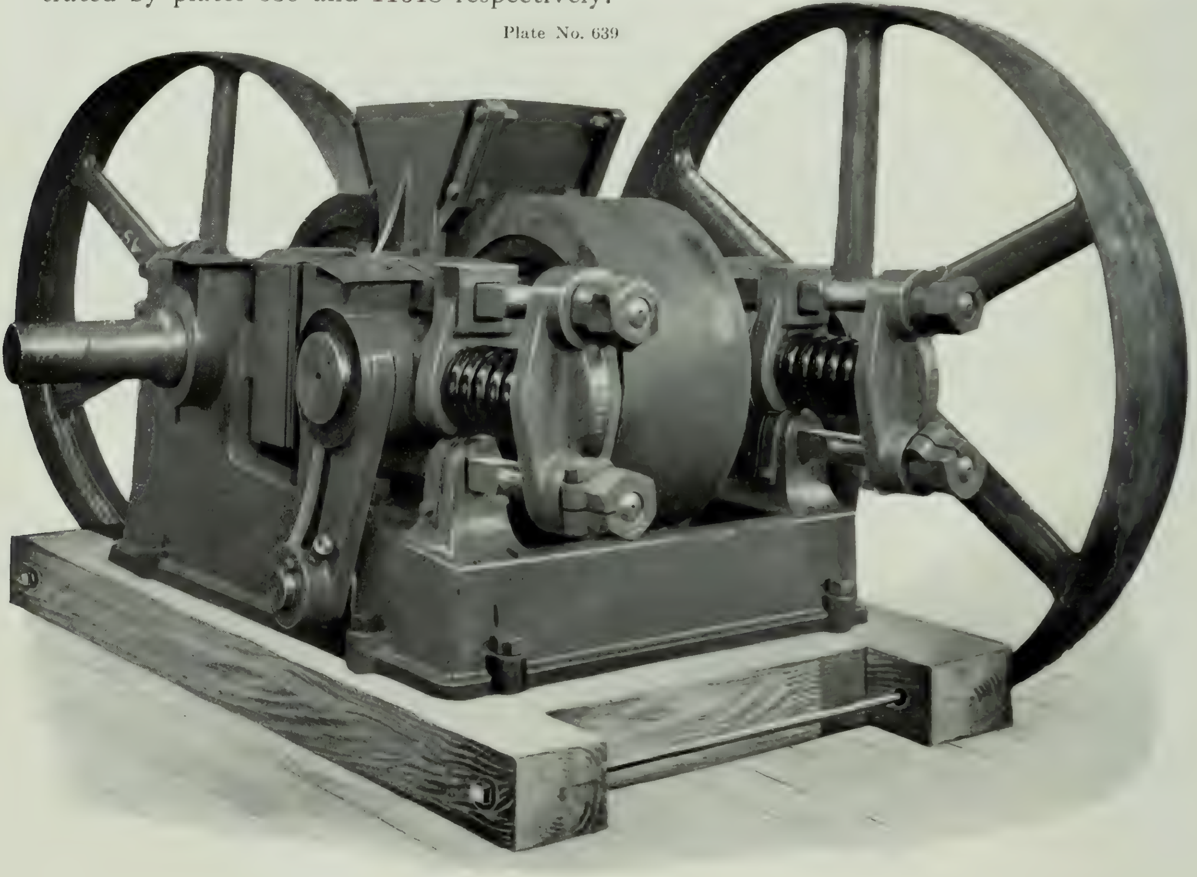


Size of Rolls	DIMENSIONS OF ROLLS													Wood Frame					
Inches	A	B	C	D	E	F	G	H	J	K	Holding Down Bolts	Large Pulley	Small Pulley	L	M	N	O	P	Q
24″ x 8″	5′ 2½″	2′ 4⅞″	3′ 3⅞″	21″	2′ 1″	3¼″	6′ 4½″	3½″	5′ 4¾″	2′ 3½″	1⅛″	60″ x 8½″	26″ x 8½″	20″	8″	8″	16⅞″	10″	10″
24″ x 10″	5′ 2½″	2′ 6⅞″	3′ 5⅞″	21″	2′ 1″	3¼″	6′ 4½″	3½″	5′ 6¾″	2′ 4½″	1⅛″	60″ x 8½″	26″ x 8½″	20″	8″	8″	18⅞″	10″	10″
24″ x 12″	5′ 2½″	2′ 8⅞″	3′ 7⅞″	21″	2′ 1″	3¼″	6′ 4½″	3½″	5′ 8¾″	2′ 5½″	1⅛″	60″ x 8½″	26″ x 8½″	20″	8″	8″	20⅞″	10″	10″
24″ x 14″	5′ 2½″	2′ 10⅞″	3′ 9⅞″	21″	2′ 1″	3¼″	6′ 4½″	3½″	5′ 10¾″	2′ 6½″	1⅛″	60″ x 8½″	26″ x 8½″	20″	8″	8″	22⅞″	10″	10″
30″ x 10″	6′ 3″	2′ 10″	3′ 11″	23¼″	2′ 7¼″	3¾″	7′ 6½″	4″	6′ 5″	2′ 9″	1¼″	78″ x 10½″	34″ x 10½″	2′ 6½″	8″	8″	20″	12″	10″
30″ x 12″	6′ 3″	3′ 0″	4′ 1″	23¼″	2′ 7¼″	3¾″	7′ 6½″	4″	6′ 7″	2′ 10″	1¼″	78″ x 10½″	34″ x 10½″	2′ 6½″	8″	8″	22″	12″	10″
30″ x 14″	6′ 3″	3′ 2″	4′ 3″	23¼″	2′ 7¼″	3¾″	7′ 6½″	4″	6′ 9″	2′ 11″	1¼″	78″ x 10½″	34″ x 10½″	2′ 6½″	8″	8″	24″	12″	10″
30″ x 16″	6′ 3″	3′ 4″	4′ 5″	23¼″	2′ 7¼″	3¾″	7′ 6½″	4″	6′ 11″	3′ 0″	1¼″	78″ x 10½″	34″ x 10½″	2′ 6½″	8″	8″	2′ 2″	12″	10″
36″ x 12″	7′ 3″	3′ 1″	4′ 2¼″	2′ 1½″	2′ 10¼″	4½″	8′ 4½″	6½″	6′ 5½″	2′ 9″	1½″	84″ x 10½″	42″ x 10½″	3′ 0″	10″	9″	23″	16″	10″
36″ x 14″	7′ 3″	3′ 3″	4′ 4¼″	2′ 1½″	2′ 10¼″	4½″	8′ 4½″	6½″	6′ 7½″	2′ 10″	1½″	84″ x 10½″	42″ x 10½″	3′ 0″	10″	9″	2′ 1″	16″	10″
36″ x 16″	7′ 3″	3′ 5″	4′ 6¼″	2′ 1½″	2′ 10¼″	4½″	8′ 4½″	6½″	6′ 9½″	2′ 11″	1½″	84″ x 10½″	42″ x 10½″	3′ 0″	10″	9″	2′ 3″	16″	10″
42″ x 16″	8′ 6″	3′ 8″	4′ 11″	2′ 8″	2′ 11¼″	8½″	9′ 6″	10″	7′ 11¾″	3′ 5¼″	1¾″	96″ x 15½″	48″ x 12½″	3′ 4″	10″	14″	2′ 4″	16″	10″

OTHER STYLES OF CRUSHING ROLLS

We make a large variety of crushing rolls in addition to our Styles "A" and "B." The most widely used of the other types are the "Economic" and Style "C" rolls, as illustrated by plates 639 and 11618 respectively.

Plate No. 639



"Economic" Rolls

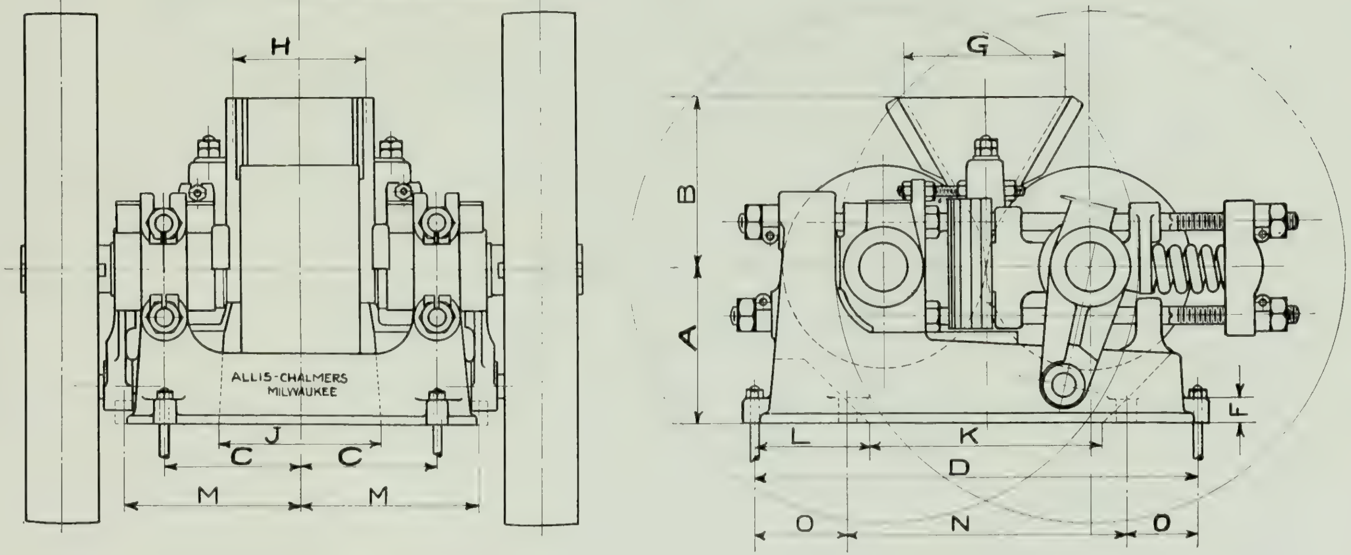
Size of Rolls, Inches Diameter By Face	Size of Driving Pulleys	Revolutions per Minute	Total Weight Without Housing, Pounds
*18″ x 10″	Two 42″ x 6½″	100 to 160	4,700
24″ x 14″	Two 60″ x 8″	100 to 160	10,300
30″ x 14″	Two 72″ x 10½″	75 to 130	16,500

This style of crushing roll was perfected with a view of supplying the demand for a thoroughly reliable and durable set of rolls of lower initial cost than our "High Grade" rolls. While this type of rolls lacks several features that distinguish our "High Grade" rolls, they are well constructed throughout, and where the conditions do not warrant the installation of machinery higher in first cost, these rolls will give more satisfactory returns in proportion to the expenditure than any other type of crushing rolls on the market. In designing these rolls, special attention was given to the following points, viz.: to secure an economical form of construction; to reduce the weight of the machine, at the same time preserving great strength. We make these rolls in three sizes as listed above. Further information may be obtained upon application.

*This size carried in stock.

CLEARANCE DIMENSIONS FOR "ECONOMIC" CRUSHING ROLLS

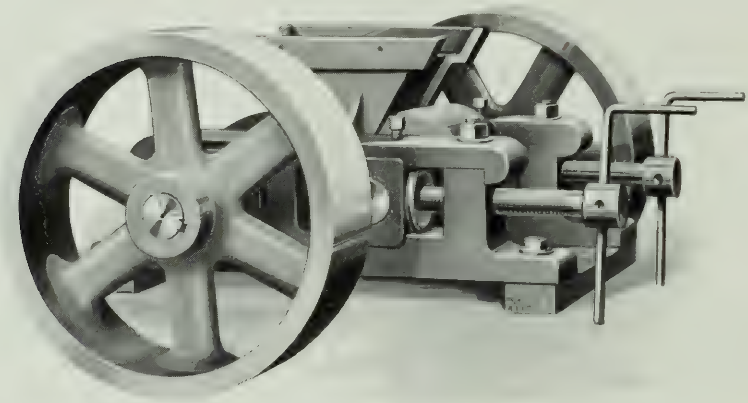
Plate No. 4236



Size of Rolls	DIMENSIONS OF ROLLS															
Inches	A	B	C	D	E	F	G	H	J	K	L	M	N	O	Holding Down Bolts	Pulleys
18″ x 10″	13¾″	15″	12½″	3′ 3″	23″	2¼″	14″	10¼″	14¾″	20″	10⅝″	....	....	....	⅞″	42″ x 6½″
24″ x 14″	18¼″	20″	16″	4′ 4″	2′ 4¼″	3″	19″	15¾″	19″	2′ 2¾″	14¼″	....	....	....	1″	60″ x 8½″
30″ x 14″	23″	24″	18″	5′ 4½″	2′ 10″	3¼″	20″	14″	20″	2′ 11″	16¾″	23¾″	3′ 4½″	12″	1″	72″ x 10½″

STYLE "C" LABORATORY ROLL

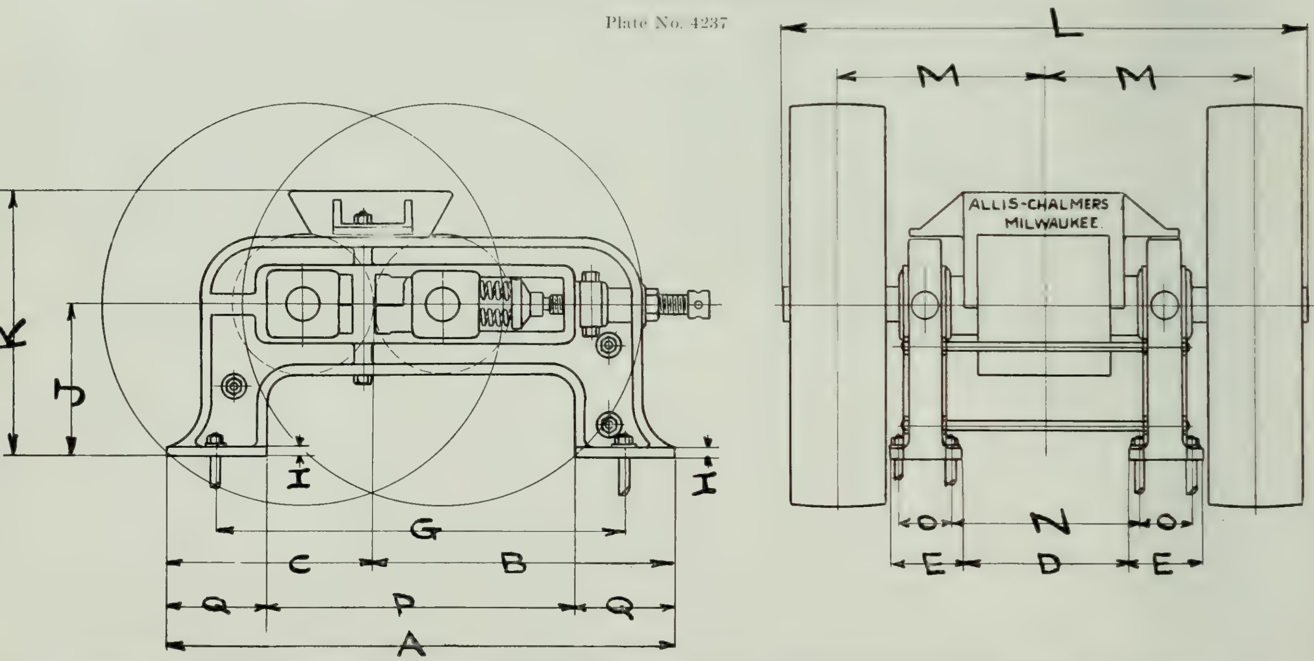
Plate No. 11618



*Size 9″x9″ Floor Space, 1′-6″ High, 3′-0″ Long, 3′-6″ Wide, Pulleys 20″x6½″, Speed 140 R. P. M.

STYLE "C" SAMPLING ROLLS

Plate No. 4237

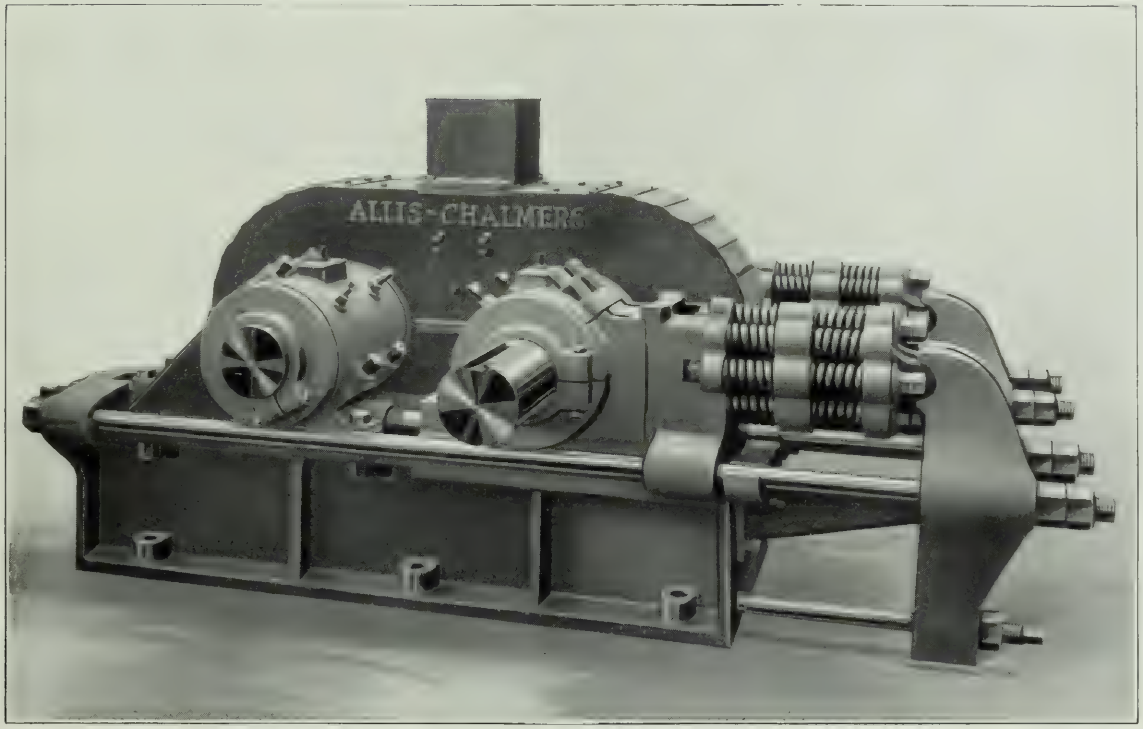


DIMENSIONS OF ROLLS

Size	A	B	C	D	E	G	H	J	K	L	M	N	O	P	Q	Holding Down Bolts	Pulleys	Rev. per Min.
*12½″x12″	3′ 8¼″	2′ 1¾″	18½″	14¼″	6¾″	2′ 11¼″	1″	13¾″	2′ 0″	3′ 9½″	18½″	15¼″	4¾″	2′ 2¼″	9″	8- ⅞″	36″ x 8½″	150
16″ x10″	4′ 5″	2′ 7″	22″	13¼″	9¾″	3′ 6″	1½″	20¼″	2′ 8⅝″	4′ 1½″	20½″	15½″	7½″	2′ 7″	11″	8-1″	36″ x 8½″	140

*These rolls carried in stock.

Plate No. 10544

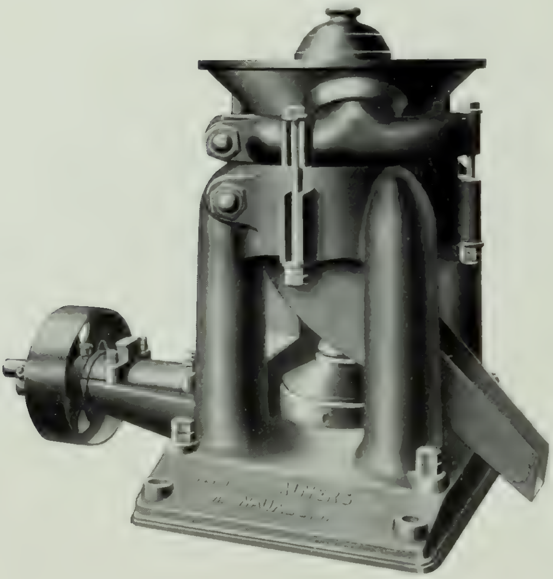


SPECIAL EXTRA HEAVY CRUSHING ROLLS

Size of Rolls, Inches, Diameter By Face	Size of Driving Pulleys	Revolutions per Minute	Total Weight with Housing, Pounds
*40″ x 15″	One 96″ x 12½″ One 48″ x 12½″	50 to 100	38,000
40″ x 30″	One 96″ x 12½″ One 48″ x 12½″	50 to 100	50,000
40″ x 36″	One 96″ x 12½″ One 48″ x 12½″	50 to 100	52,000
54″ x 16″	One 108″ x 17″ One 54″ x 13″	50 to 85	86,000
54″ x 20″	One 108″ x 17″ One 54″ x 13″	50 to 85	88,000
54″ x 24″	One 108″ x 17″ One 54″ x 13″	50 to 85	90,000

*This size carried in stock.

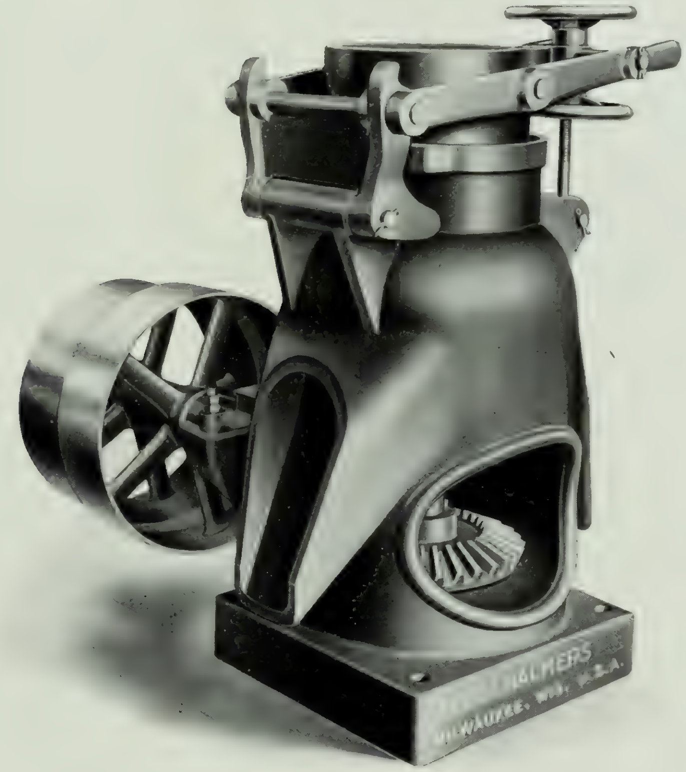
Plate No. 397



New Style "F" Gyratory Breaker
(Patented)

This breaker is the result of many years' improvement and has been designed especially for work in laboratories and sampling mills, where it is essential that a machine may be easily and rapidly dismantled to allow of a thorough cleaning of the parts. The crushing concaves are held in a concave ring, which is clamped in position, being surrounded partly by the main frame and partly by the spider. In order to dismantle the breaker for cleaning purposes, it is only necessary to slacken the three vertical bolts between the spider and the main frame, and the two horizontal bolts which clamp the main frame and the spider to the concave ring, when the spider can be removed and the concave ring and concaves lifted out, thus giving free access to brush all parts. Only a few minutes are needed to dismantle and reassemble the parts ready for operation again. This point will be greatly appreciated, when it is desirable to crush separate batches of material. The shifting discharge diaphragm is also independent, and can be revolved to discharge from either side, or in front. At the same time, it is easily removed from the machine, as the spout is detachable. This machine can be run constantly on the hardest ore. It receives pieces as large as a hen's egg, and reduces these so that nearly all will pass a $\frac{3}{8}$-inch screen. Its capacity is nearly 1,000 pounds per hour, ninety per cent of which will pass the $\frac{3}{8}$-inch screen.

Plate No. 2911

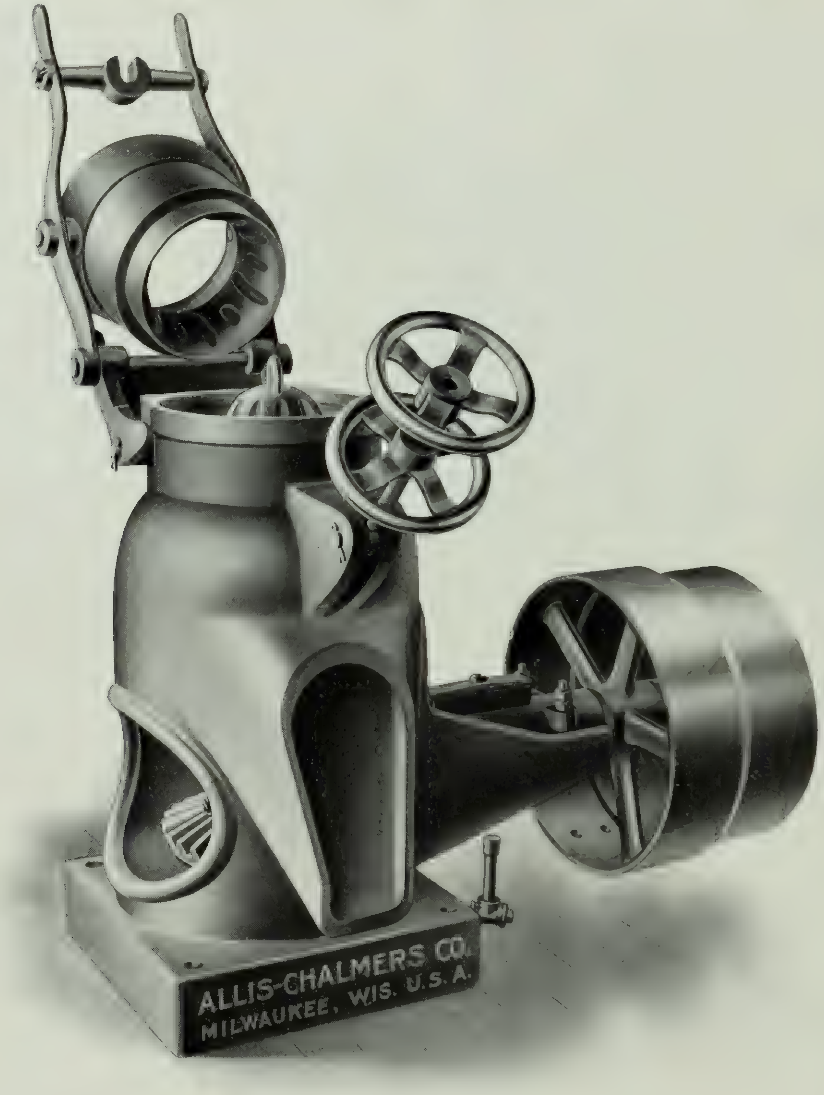


Style "B" Grinder, with Hopper Closed
(Patented)

SAMPLE GRINDER, STYLE "B"

The Style "B" sample grinder is a simple and compact machine of medium capacity, intended for plants of medium size, and other installations in which a grinder smaller than the Style "A" is desired. Style "B" grinder differs from Style "A" in that the adjustment is effected by raising and lowering the concave ring, rather than the grinding head as in the Style "A" machine. This movement is accomplished by hand wheels, shown in the illustration. The grinding concave, together with the hopper of machine, can be thrown back readily, as shown by plate 2910, to permit cleaning and inspection of machine. When these parts are thrown back they are self-supporting, and the grinding head can be readily removed from the machine. All of the bearings, gears, and other parts of the Style "B"

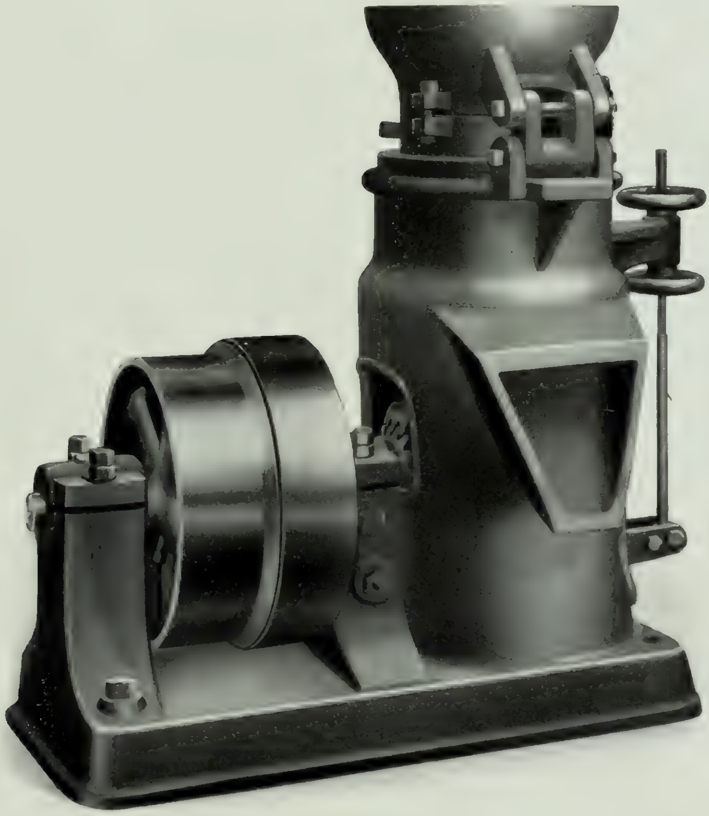
Plate No. 2910



Style "B" Grinder, with Hopper Open
(Patented)

grinder are large and the design of the machine throughout is very heavy, it being designed for the most severe continuous duty. The machine is self-contained, is constructed wholly of iron and steel, has automatic oiling devices throughout, and is without doubt the best machine of its class on the market. The Style "B" sample grinder is fitted with 16″ x 4½″ tight and loose driving pulleys, and should run 250 revolutions per minute. This grinder has a capacity of approximately 100 pounds per hour, crushing from ⅜″ to 10 mesh and finer.

Plate No. 3232

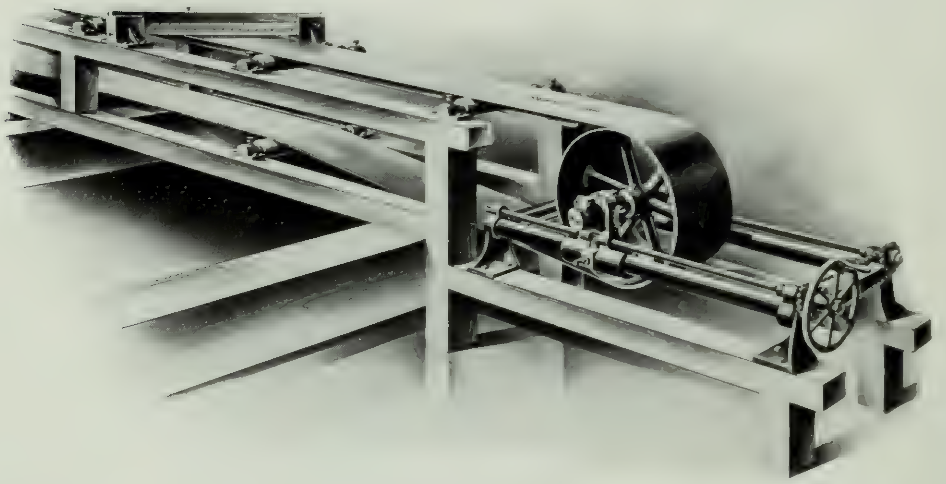


Style "A" Sample Grinder

The Style "A" sample grinder is a machine brought out to meet the demands for a grinder of large capacity, for use in large sampling mills and metallurgical plants. The machine is of the most simple and heavy construction throughout, being intended for the most severe and continuous duty. The adjustment is effected by raising and lowering the grinding head by means of the hand wheels shown in the illustration. The grinding concave and hopper of the machine can be readily thrown back to permit cleaning and inspection of machine. All bearings, gears and other parts of the machine are of large and strong proportions, and efficient automatic oiling devices are provided for all necessary parts. This grinder is provided with 4½″ x 18″ driving pulleys, which should run at 225 revolutions per minute.

This machine is self-contained, occupies a minimum amount of space and has a capacity of approximately 200 pounds per hour, crushing from ½″ to 10 mesh and finer; it may be more or less, depending upon the character of the material.

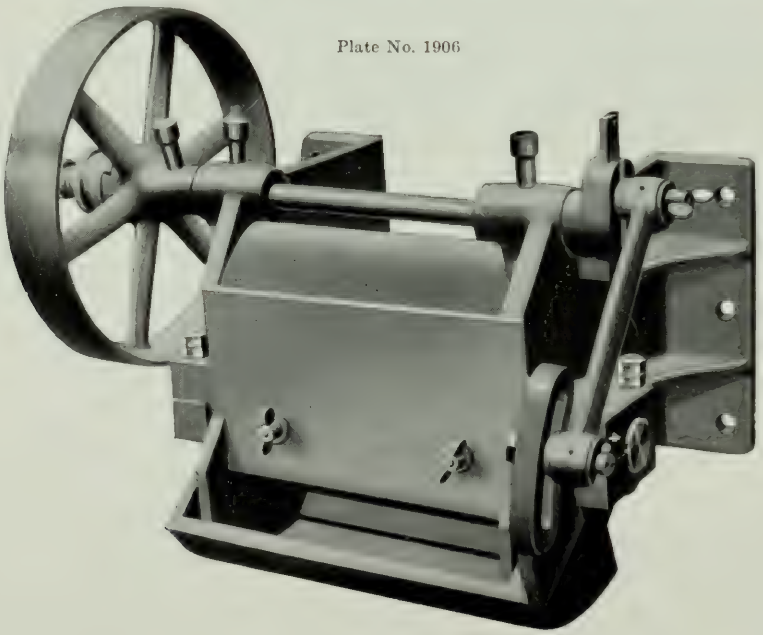
Plate No. 330



Belt Conveyors

For the conveying of ores in sampling or other plants, we have found in our long experience that a properly designed belt conveyor is superior in every way to all other types of conveyors. We design and furnish conveying systems for any class of work or capacity desired.

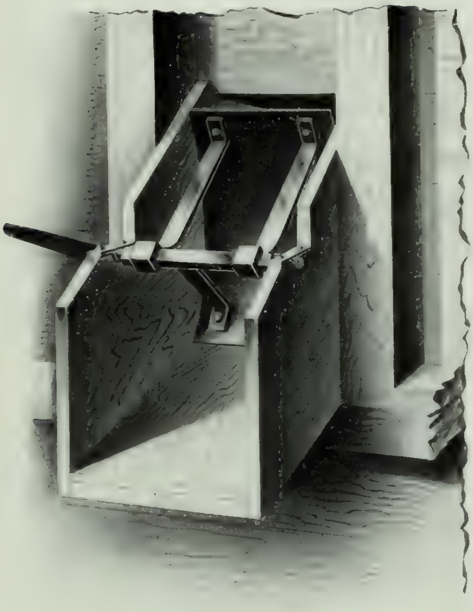
Plate No. 1906



Automatic Belt Driven Feeder
(Known as the Wall Type)

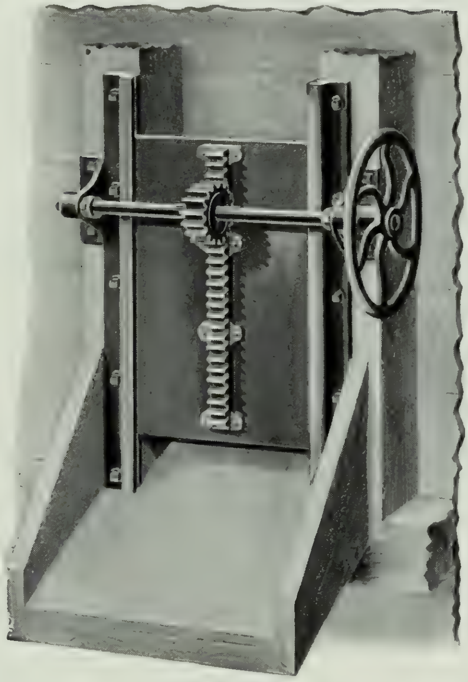
Plate 1906 shows our wall type feeder, operated by belt; a very useful accessory for maintaining proper feed of ore to machinery in sampling mills.

Plate No. 301



Radial Lever Type Gate

Plate No. 309



Standard Rack and Pinion Type Gate

ORE GATES

On this page are illustrated two designs of our standard types of ore gates used about sampling mills.

Plate 309 shows our standard rack and pinion type gate, which is used principally for main bins about sampling plants, and other bins where the gates do not have to be opened and closed frequently.

Plate 301 shows our radial lever type gate. This gate is used principally for bins which are drawn from frequently, such as the bins of smelting and sampling plants, from which the furnace charges are made up.

Plate 1906 (on preceding page) shows our "wall type" feeder. This feeder is used where large capacities are required and the material to be handled is comparatively large in size.

SCALES, BARROWS AND ORE CARS

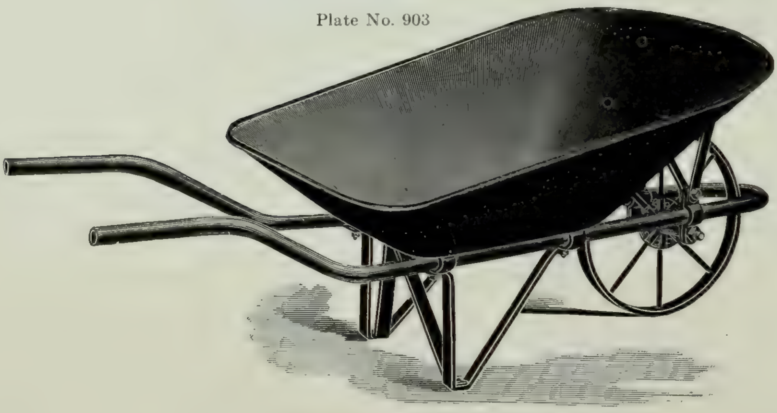
We furnish scales of railroad type, wagon scales, platform scales, wheelbarrow scales of any type of capacity desired, for use in and about sampling mills.

We also furnish wheelbarrows, or barrows of any design desired, for use about sampling mills, and ore cars of any design or capacity desired. On the following pages are illustrations of various types of scales, wheelbarrows and ore cars.

Plate No. 1425

Dormant Platform Scales

Plate No. 903



Tubular Steel Frame Tray Barrow

563

ORE CARS

Plate No. 9772

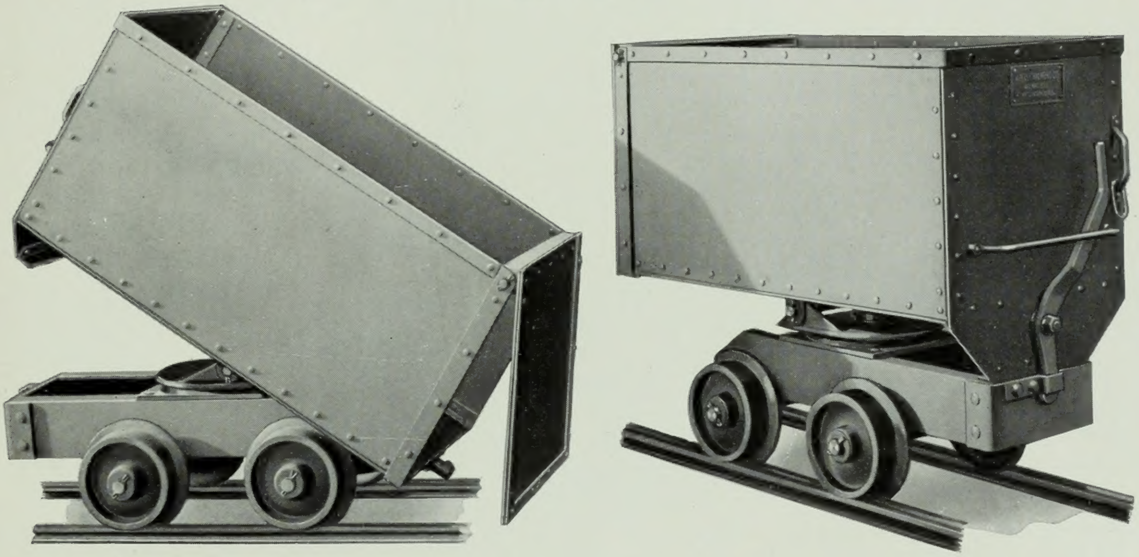
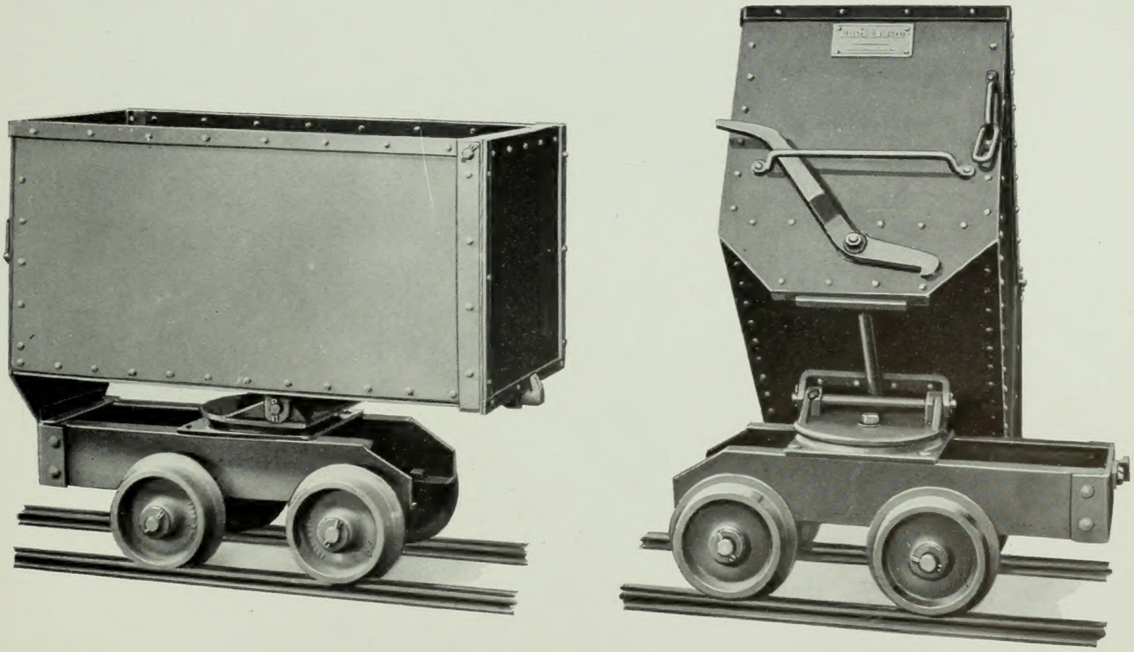


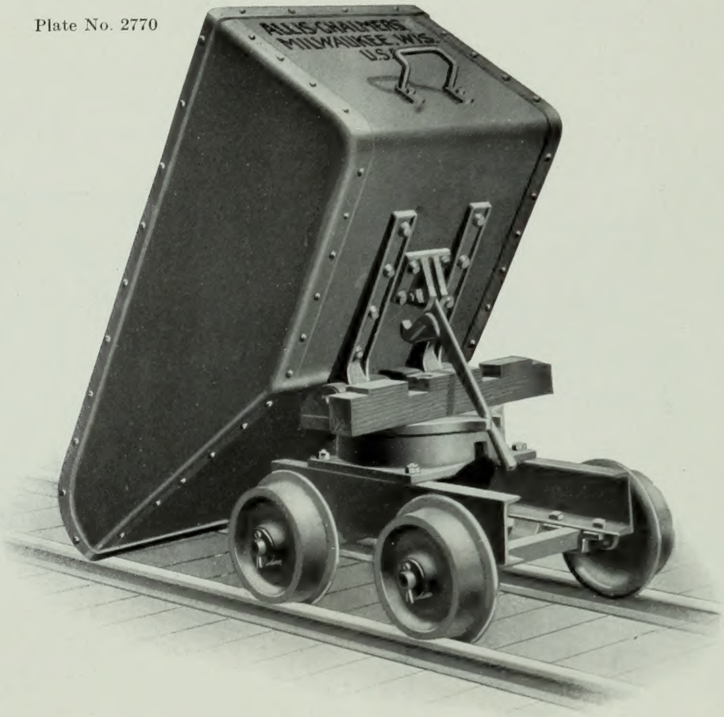
Plate No. 9773



New "Standard" (Side and End Dump)

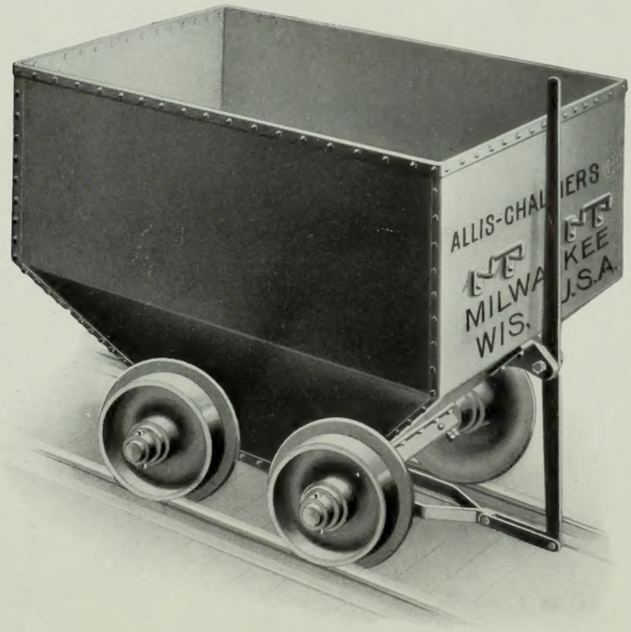
[illegible]364

Plate No. 2770



Scoop Body Car

Plate No. 2764



Hopper Bottom Car

A565

Allis-Chalmers Manufacturing Company's

PRINCIPAL PRODUCTS

AGRICULTURAL MACHINERY

- Farm Tractors
- Rotary Soil Tillers

AIR BRAKES

AIR COMPRESSORS

- Steam Driven
- Belt Driven
- Electrically Driven, Portable
- Electrically Driven, Stationary
- Hydraulic Driven

CEMENT MACHINERY

- Ball Mills
- Ball Tube Mills
- Balls, Forged
- Crushing Rolls
- Elevators
- Feeders
- Gyratory Breakers
- Hoists
- Mixing Pans
- Perforated Metals
- Revolving Screens
- Rotary Coolers and Dryers
- Rotary Kilns
- Tube Mills
- Tube Mill Linings
- Tube Mill Pebbles

COAL MINING MACHINERY

- Barney Cars
- Crushing Rolls
- Hoisting Cages
- Revolving Screens
- Shaking Screens
- Ventilating Fans

CONDENSERS

- Barometric
- Jet
- Surface

CRUSHING MACHINERY

- Ballast Plants
- Crushing Rolls
- Dumping Skips
- Elevators
- Gyratory Breakers
- Jaw Crushers
- Macadam Plants
- Perforated Metals
- Portable Crushing Plants
- Revolving Screens
- Quarry Cars

ENGINES

- Corliss Engines
- Gas Engines
  - Diesel Oil Engines
- Blowing Engines
- Rolling Mill Engines

FORGINGS

PERFORATED METALS

FLOUR MILL MACHINERY

- Aspirators
- Bolters, Universal
- Bolting Cloth
- Bolting Cloth Cleaners
- Bran and Shorts, Dusters
- Bran Packers
- Conveyors, Spira
- Corn Mills
- Fans
- Feed Mills
- Feed Screens
- Flour Dressers
- Flaking Machines
- Flour Feeders and Mixers
- Flour Packers
- Granulators
- Purifiers
- Reels
- Rolls
- Roller Mills
- Rolling Screens
- Scalpers

HOISTS

- Electric Driven
- Steam Driven

HYDRAULIC MACHINERY

- Francis Turbines
- Impulse Wheels
- Oil Pressure Governors
- Pressure Regulators
- Accessories

MANGANESE BRONZE CASTINGS

MINING MACHINERY

- Amalgam Appliances
- Chilian Mills
- Concentrating Plants
- Conveyors
- Copper Converting Plants
- Cyanide Plants
- Elevators
- Frue Vanners
- Gold and Silver Mills
- Gyratory Breakers
- Huntington Mills
- Jaw Crushers
- Jigs
- Lead Refining Plants
- Mine Ventilating Machinery
- Mortar Mills
- Ore Buckets
- Ore Feeders
- Prospecting Mills
- Roasting Furnaces
- Sampling Plants
- Skips
- Smelting Machinery
- Stamps, Atmospheric
- Stamps, Gravity
- Stamps, Steam
- Tube Mills, Wet and Dry

POWER TRANSMISSION MACHINERY

- Belt Tighteners
- Boxes
- Couplings
- Gears
- Hangers
- Pulleys
- Rope Sheaves
- Shafting

PUMPING MACHINERY

- Centrifugal Pumps
- Fire Service Pumps
- Geared Pumps
- "High Duty" Pumping Engines
- Hydraulic Transmission Pumps
- Screw Pumps

ROLLING MILL MACHINERY

SAW MILL MACHINERY

- Band Mills, Double Cutting
- Band Mills, Single Cutting
- Band Mills, Telescopic
- Band Re-saws, Horizontal
- Band Re-saws, Vertical
- Board Lifters, Steam
- Cant Flippers, Steam
- Canting Machine, Overhead
- Carriages
- Circular Saw Mills
- Conveying Machinery
- Cutting Off Saws, Steam Feed
- Edgers
- Edging Grinders
- Feeds, Steam, Direct Acting
- Feeds, Steam, Twin Engine
- Filing Room Tools
- Lath Mills and Bolters
- Live Rolls and Drives
- Log Chains
- Log Jacks
- Log Loaders
- Log Turners
- Niggers, Steam
- Set Works
- Slashers
- Steam Feed Valves
- Stock Lifters, Steam
- Transfers
- Trimmers

SUGAR MACHINERY

TIMBER TREATING AND PRESERVING MACHINERY

TURBINES—STEAM

TURBINES—WATER

ELECTRICAL APPARATUS

ALTERNATING CURRENT GENERATORS AND MOTORS

- Belted Type Generators
- Engine Type Generators
- Fly-wheel Type Generators
- Turbo Generators
- Water-wheel Type Generators
- Synchronous Frequency Changers
- Induction Motor Frequency Changers
- Synchronous Motor-Generator Sets
- Induction Motor-Generator Sets
- Synchronous Motors
- Synchronous Condensers
- Induction Motors
- Transformers
- Rotary Converters

DIRECT CURRENT GENERATORS AND MOTORS

- Belted Type Generators
- Engine Type Generators
- Small Bipolar and Multipolar Motors and Generators
- Electric Railway Equipments, Motors, Controllers, etc.
- Multiple Voltage Balancing Sets
- Multiple Voltage Variable Speed Equipments

SWITCHBOARDS FOR DIRECT CURRENT AND ALTERNATING CURRENT

566

Allis-Chalmers Manufacturing Company

General Offices, ... Milwaukee, Wis.

DISTRICT OFFICES

Atlanta, Ga., 1104 Healey Bldg.
Boston, Mass., 50 Congress St.
Buffalo, N. Y., Ellicott Square Bldg.
Chicago, Ill., Peoples Gas Bldg.
Cincinnati, O., First National Bank Bldg.
Cleveland, O., Schofield Bldg.
Dallas, Texas, Sumpter Bldg.
Denver, Colo., First National Bank Bldg.
Detroit, Mich., Ford Bldg.
Duluth, Minn., Alworth Bldg.
El Paso, Texas, 2900 San Diego St.
Indianapolis, Ind., 516 Traction Terminal Bldg.
Kansas City, Mo., Waldheim Bldg.
Los Angeles, Cal., Title Insurance Bldg.
Milwaukee, Wis., West Allis Works
Minneapolis, Minn., Corn Exchange Bldg.
New Orleans, La., Maison Blanche Bldg.
New York, N. Y., 50 Church Street
Philadelphia, Pa., 903 Pennsylvania Bldg.
Pittsburgh, Pa., 1209 Park Bldg.
Portland, Ore., 92 First St.
St. Louis, Mo., Railway Exchange Bldg.
Salt Lake City, Utah, Kearns Bldg.
San Francisco, Cal., Rialto Bldg.
Seattle, Wash., 115 Jackson Street
Toledo, O., Ohio Bldg.

FOREIGN DISTRICT OFFICES

London, England, 732 Salisbury House, London Wall, E. C.
Santiago, Chile, Huerfanos 1157, Casilla 2653.

CANADIAN REPRESENTATIVES

Canadian Allis-Chalmers, Limited: Toronto, Ont.

FOREIGN SALES AGENCIES

Auckland, New Zealand,	John Chambers & Sons, Ltd.
Bombay, India,	Marshall Sons & Co.
Buenos Aires, Argentine Republic,	American Trading Company
Calcutta, India,	Marshall Sons & Co.
Honolulu, Hawaii,	Hoholulu Iron Works
Ipoh, Federated Malay States,	McAlister & Co., Ltd.
Johannesburg, South Africa,	Herbert Ainsworth
Kobe, Japan,	American Trading Company
Manila, Philippine Islands,	American Trading Company
Paris, France,	R. Sequin
Perth, West Australia,	Frank R. Perrot
Rio de Janeiro, Brazil,	American Trading Company
Petrograd, Russia,	International Engineering & Trading Co.
Shanghai, China,	American Trading Company
Singapore, Straits Settlements,	McAlister & Co., Ltd.
Sydney, Australia,	Frank R. Perrot
Sydney, Australia,	Standard-Waygood, Ltd.
Yokohama, Japan,	American Trading Company